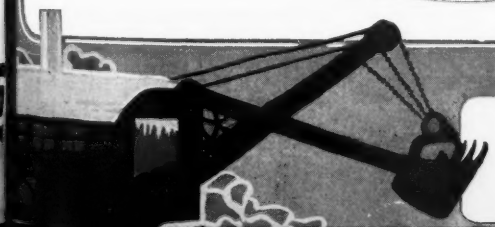
# Pit and Quarry

SAND - GRAVEL - STONE
CEMENT - LIME - GYPSUM



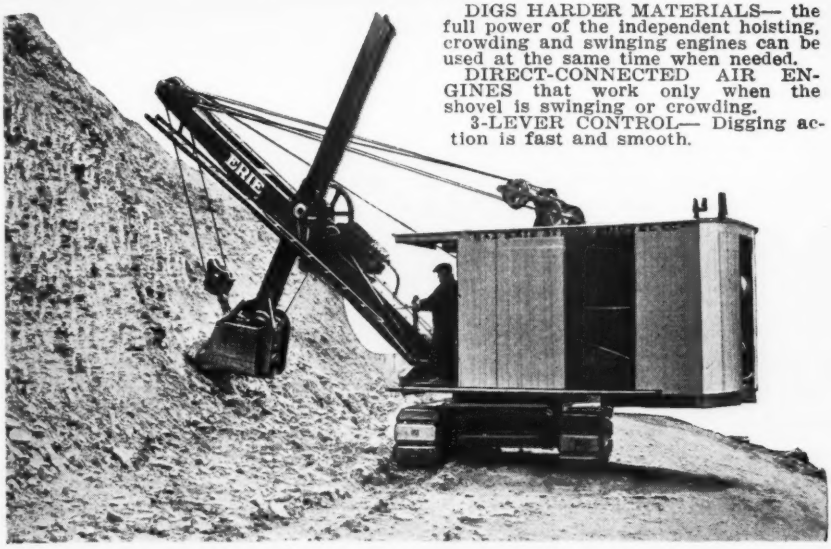




February 15, 1926





Circulation 7,500




DIGS HARDER MATERIALS— the full power of the independent hoisting, crowding and swinging engines can be used at the same time when needed.
DIRECT-CONNECTED AIR ENGINES that work only when the shovel is swinging or crowding.
3-LEVER CONTROL— Digging action is fast and smooth.

## From Oklahoma—Michigan—Oregon—Pennsylvania—California

From all over the country— reports keep coming in telling of the splendid service given by Gas+Air ERIES.

The more shovel owners use these machines, the better they like them. Just got a letter from W. M. McMichael, of Tulsa, Okla. He writes:

"Want to tell you how well pleased we are with the Gas+Air ERIE. It has come up to every expectation and we feel qualified to say it's the best gas machine on the market.

"This shovel is turning out an *average* of 796 yards a day, and we find that the low cost of operation is another valuable point."— W. M. McMichael, Tulsa, Oklahoma. (3 ERIES).

*Other Gas+Air* ERIES *are giving the same good results*

Mr. McMichael tells the same story that has been told by others—North and South, East and West.

The Gas+Air ERIE is a gasoline shovel— but has no reversing frictions on hoisting, crowding or swinging.

Instead, direct-connected air engines for crowding and swinging give the Gas+Air ERIE the simplicity and reliability needed to do steady work.

See the Gas+Air ERIE at work—size it up by *performance*. You can count on the same good results that other owners are getting.

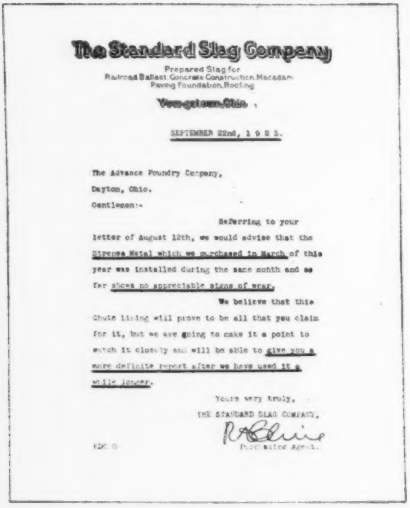
**ERIE STEAM SHOVEL CO., ERIE, PA., U. S. A.**

Builders of ERIE Shovels, Cranes, Ditchers, Draglines, Trench Hoes, etc.
Branch Offices: Boston, New York, Philadelphia, Pittsburgh, Atlanta, Chicago
Representatives throughout the U. S. A.

**ERIE GAS+AIR Shovel and Crane**

*Fully protected by basic patents*

# HERE IS PROOF



The Standard Slag Company

Prepared Slag for
Railroad Ballast Concrete Construction Macadam
Paving Foundation Roofing

Youngstown, Ohio.

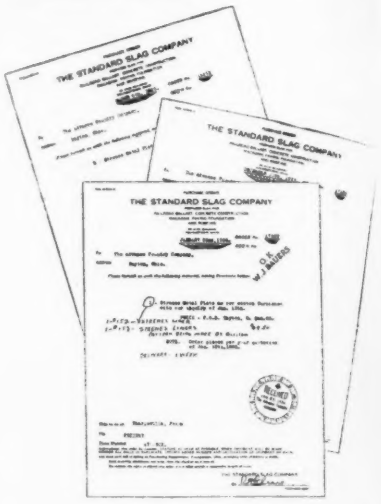
SEPTEMBER 22nd, 1 9 2 5.

The Advance Foundry Company,
Dayton, Ohio.
Gentlemen:-

Referring to your letter of August 12th, we would advise that the Strenes Metal which we purchased in March of this year was installed during the same month and we find shows no appreciable signs of wear.

We believe that this Chute Lining will prove to be all that you claim for it, but we are going to make it a point to watch it closely and will be able to give you a more definite report after we have used it a while longer.

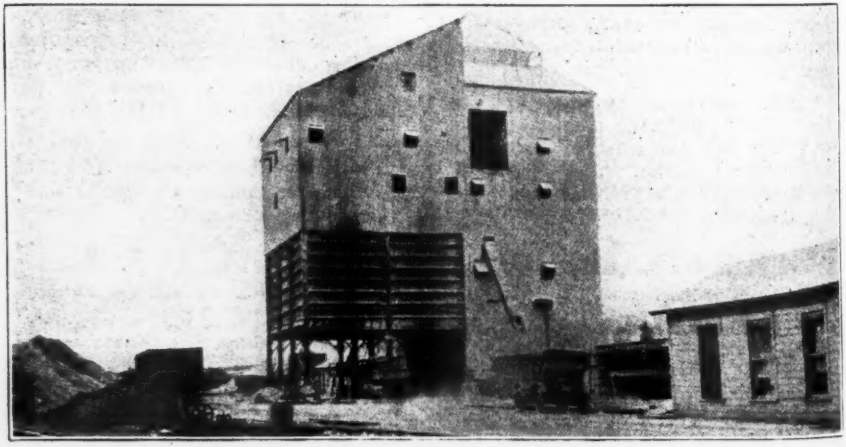
Yours very truly,
THE STANDARD SLAG COMPANY,
R. E. Line
Purchasing Agent.




The worth of any material is not proven by sales made by the manufacturer but is proven through repeat orders from thoroughly satisfied users.

## ON THE DAY YOU INSTALL
## STRENES CHUTES OR LININGS
## YOUR CHUTE TROUBLES STOP AND YOUR SAVINGS START

***FOR FURTHER EVIDENCE WRITE FOR BULLETIN 26-P***



## THE ADVANCE FOUNDRY CO., Dayton, O.

# KOEHRING

## Crane Excavator

## Far Greater Clutch Frictional Area!

THAT'S why the Koehring has *Finger-tip control* at the levers!

*Levers* work easy because the far greater contact surfaces of the double outside band, equalizing friction *clutch* makes the levers work easy!

So, you have Finger-tip control without mechanical complications to help shift levers which ought not to be hard shifting in the first place. The Koehring operator does not lose the *"feel"* of the bucket—an important factor in accuracy of operation!

**Crane Capacities**

No. 1—¾ cu. yd. clamshell bucket on 40 ft. boom or ¾ cu. yd. on 45 ft. boom. Lifting capacity, 10 tons at 12 ft. radius, 4 cylinder, 5x6 in. gasoline engine, 1,100 R.P.M.

No. 2—1¼ cu. yd. clamshell bucket on 45 ft. boom or 1 cu. yd. on 50 ft. boom. Lifting capacity, 15 tons at 12 ft. radius, 4 cylinders, 6x7 in gasoline engine, 925 R.P.M.

KOEHRING HEAVY DUTY

*Write for Crane Bulletin No. Cr-32.*

**KOEHRING COMPANY**

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A2688

# MASSILLON
## The Popular Shovel

EVERYBODY likes a man or a machine possessed of unlimited power and vim. That's the Massillon, full of rip-roaring capacity for work, and the ability to tear through it all whether it be hard or easy. Ask those who use it and **know.**

***Send today for literature***

## THE RUSSELL & CO.

*BUILDERS*

MASSILLON, OHIO

**The MODERN MASSILLON**

**Steam** — 3/4—7/8 RANGE — **Shovel**

# have never seen before

BRUTE in name, power, in size. Brute in terrific stamina and tremendous endurance. Big Brute is built to stand impregnable against the most brutal requirements of man and industry.

Beautiful in its brutal ugliness, Big Brute looks what it is . . .. a *Colossus among the Giants of modern transportation.* With the operating ease of a lithe passenger vehicle: a Fisher-Built Cab to furnish driver's comfort unknown before, and mechanical improvements years beyond the ordinary conception of today, it stands to change the industrial motor transportation of the world.

## A Truck Without "Bugs"

From its vast engineering experience, covering the production of over 4,849,485 passenger and commercial cars, during the last 25 years, General Motors Corporation has eliminated, in Big Brute, the vital weaknesses, the engineering mistakes, the structural flaws previously common among heavy duty trucks. **Big Brute is a truck without "bugs."** More than 71% of all motor vehicles made and sold by General Motors are now in active service.

The motor trucks of the entire world were studied by General Motors engineers in developing Big Brute. It was learned why some trucks rendered but limited service. Why others surpassed them. Why some operated under nominal upkeep, while others were economic failures. One by one, these factors were met, analyzed and weighed. All mistakes of past years were corrected. *A new standard in heavy transportation thus was set.*

## Sold Under GMAC Plan

Big Brute, like all other products of the General Motors Corporation, is offered under the liberal General Motors Acceptance Corporation Plan of deferred payments—the lowest cost under which any motor car or truck can be financed on time payments.

GENERAL MOTORS TRUCK COMPANY
PONTIAC, MICH.

*Products of*
**Yellow Truck and Coach Manufacturing Company**
*subsidiary of General Motors*
GMC Big Brute, 3½ and 5 ton trucks
GMC 1, 1½ and 2½ ton trucks
Yellow Cabs Yellow Coaches
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Hertz Drivurself Cars
GMC 5 to 15 ton Tractors

# GMC Big Brute

*Linn Waukesha Motored Snow Plow Tractor*


# Plowing Thru Seas of Snow

**North of "Thirty Eight" highway officials must keep their highways open in spite of snow. Plowing thru seas of snow with the mercury below zero is not for makeshift equipment or "hot house" men. "He men" and "Brute" equipment are needed. Fleets of Linn Tractor Plows are being used in most of the snow fighting states this winter. Waukesha heavy duty type motors provide the high power and reliability required, as well as ease of operation in coldest weather.**

*No more severe motor conditions are encountered in crowding a power shovel than in bucking snow drifts, nor more responsiveness needed in maneuvering a boom than guiding one of these shovels. Write for "Heavy Duty" Motor Bulletins describing Power Shovel Type motors with Waukesha "Ricardo Head."*

## WAUKESHA MOTOR COMPANY

Waukesha Wisconsin

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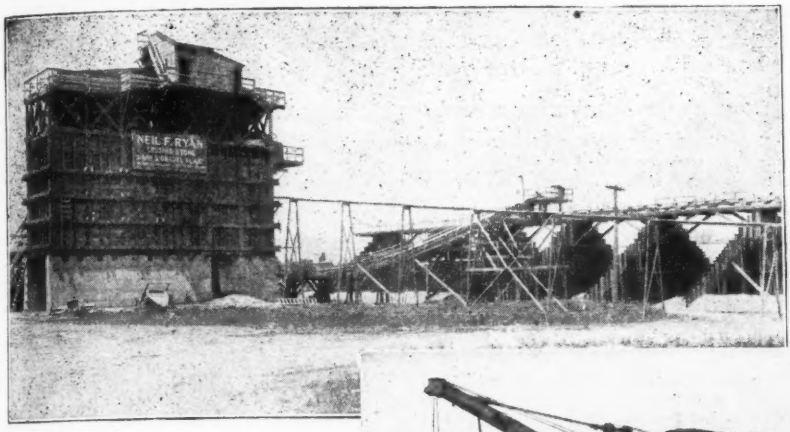
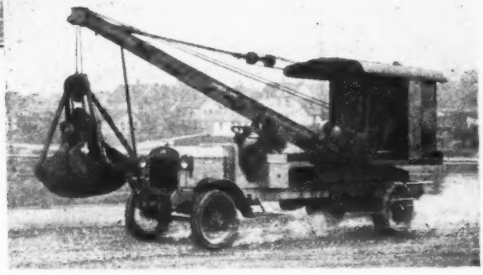
| *Aeolian Building* | *V. L. Phillips Co.* | *Wilson Machy. Co.* | *C. F. Camp Co.* | *Portable Rotary Rig Co.* |

*Exclusive Builders of Heavy Duty Gasoline Engines for Nearly Twenty Years*





# *Mobility— Speed— Greater Capacity*

A cost-reducing feature of the efficient material handling system at the Neil F. Ryan's crushed stone, sand and gravel plant at Schenectady, N. Y., is a Universal Crane mounted on a motor truck, equipped with a ½-yd. bucket.

The great capacity, mobility and speed of the Universal Crane **reduces costs.** Its motor-truck mounting transfers it quickly from one job to another. Its rapid swing gives it quick handling capacity; it costs less to operate than larger machines.

The Universal is adaptable to wide service,—to moving material from pit or quarry to trucks; from trucks to storage; storage to trucks; storage to cars; storage to storage; or yard to yard.

***Write us today for descriptive Bulletin 281-A***

## THE UNIVERSAL CRANE CO., Cleveland, Ohio

Cleveland: 938 Swetland Bldg.
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# CLYDE

## Quarry Hoists and Derricks

## STEAM-ELECTRIC

A year ago the above illustrated CLYDE installation was made at the sand and gravel pit of A. Beatrice & Sons, Boston.

The CLYDE equipment installed consists of the steel derrick, steam hoist and a separate swinging engine.

The production of this pit is 250 yards daily and the operators express the greatest enthusiasm concerning the performance of the CLYDE installation.

Detailed information upon request given cheerfully by the home office or any Clyde branch.

You'll take Pride in your Clyde!

**CLYDE IRON WORKS SALES COMPANY**

**Sole Distributors for CLYDE IRON WORKS, Duluth, Minn.**

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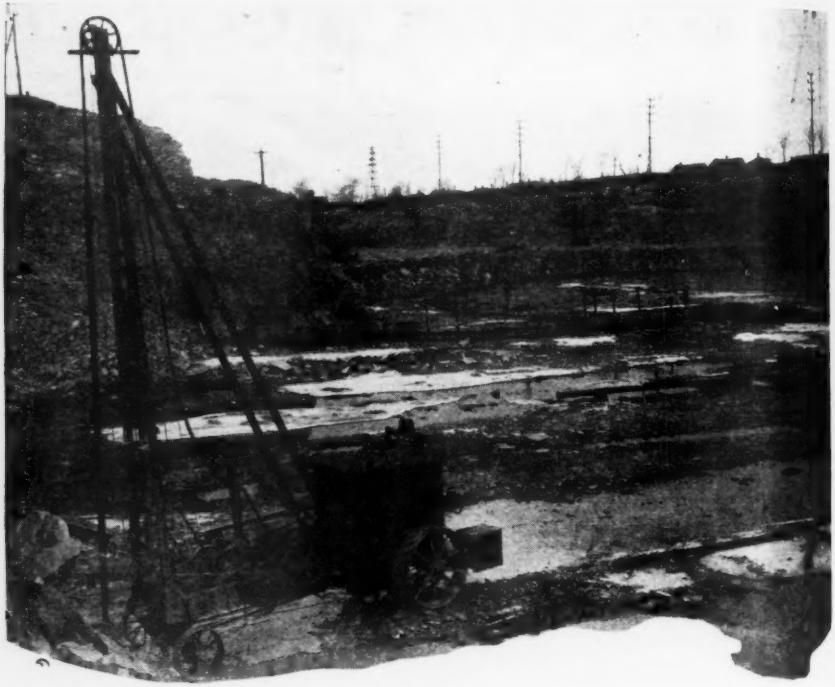


# "Taking Up Bottom" at Kokomo

THIS Cyclone No. 14 Standard Electric Traction Drill is putting down 18 foot holes, 5⅝ inches in diameter, on the old quarry floor of the Kokomo Stone Company, Kokomo, Indiana, for the purpose of lowering the floor 16 feet.

Although the holes are short for a big blast hole drill, the machine is doing the work economically when compared with any other method. The traction feature cuts down moving time. The electric motor takes power trouble from the driller's shoulders. The Cyclone geared construction and steel castings eliminate sudden breakdowns. The Cyclone SPUDDING DEVICE assures the maximum drilling speed.

This drill was installed in the summer of 1925 especially for this job, although later it will be used on top. This is the fourth Cyclone No. 14 Drill purchased by the Kokomo Stone Company. They bought their first Cyclone in 1910 when well drills were a novelty for quarry work.

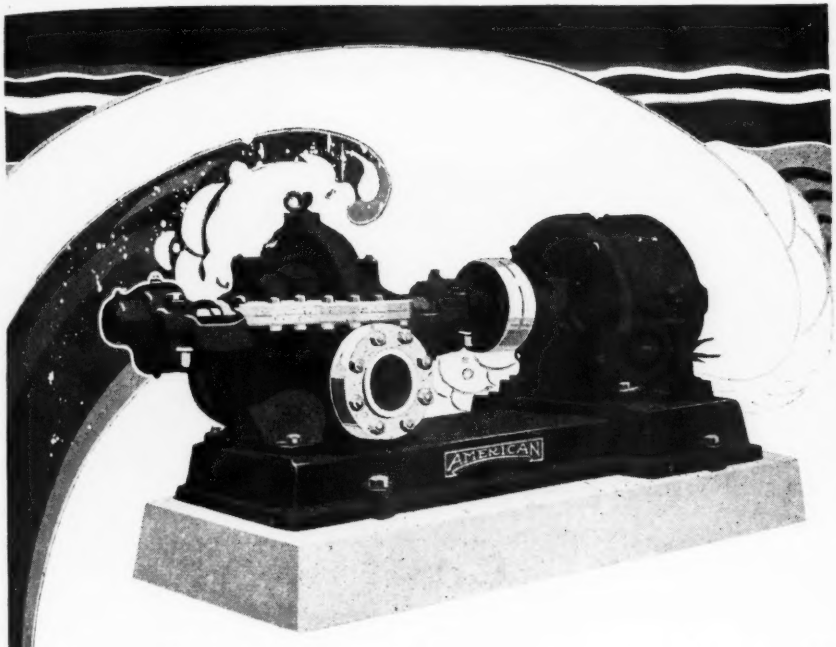
Our 120-page book "Big Blast Hole Drills" will help you to understand why Cyclone Drills predominate in crushed stone quarrying. Write for a copy.

**The Sanderson-Cyclone Drill Co.**

**Orrville, Ohio**

**Eastern and Export Office, 30 Church St., New York**

**CYCLONE NUMBER FOURTEEN BIG BLAST HOLE DRILLS**

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"American" pumps are husky in design. All bearings are of generous proportion. Each type is compact. Wide footings and ample bases give great rigidity. Hydraulic efficiencies are high. And each "American" pump is absolutely guaranteed for the service for which it is recommended!

## THE AMERICAN WELL WORKS

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**San Francisco, Calif.....635 Mission Street**

AMERICAN
AURORA, ILL.

# Designed to take a Choke Feed

Here's a Reduction Crusher that not only will take a choke feed but actually works at its best that way. This isn't accident—it's design—*Telsmith Design.*

The openings in Telsmith's big, open feed hopper are so large that they permit an unregulated gravity feed. Automatic feeders are not necessary. Cover it with rock—five, ten, even twenty feet deep—there will be no stalling, no digging out of rock with Telsmith on the job.

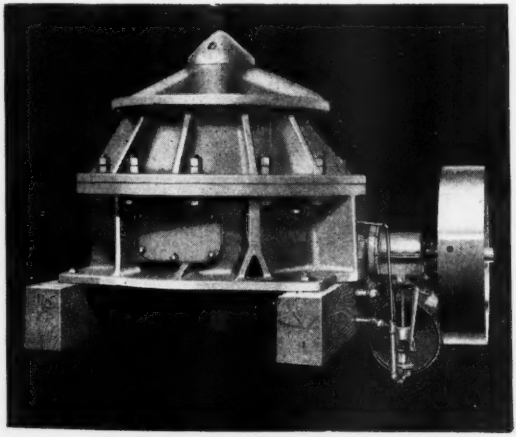
With its enormous discharge circle—increased by the outward flare of the head and concaves—Telsmith discharges, as it feeds—by gravity—without centrifugal action and with very slight wear upon the spider arms.

Telsmith performance is *INSURED*—pillar shaft, steel frame and steel crown are *guaranteed* against breakage by tramp iron. Bulletin No. 2F15 gives all the details. Send for it today.

**SMITH ENGINEERING WORKS**

**88 Lake Boulevard** **Milwaukee, Wisconsin**

**Canadian Representative, Canadian Ingersoll-Rand Co., Montreal, P. Q.**



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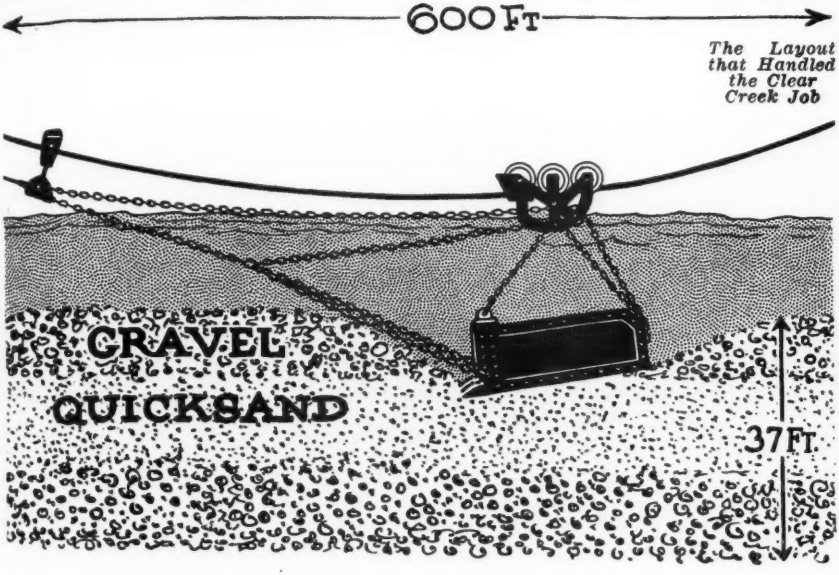
R. C. No. 1

# TELSMITH




*The Layout that Handled the Clear Creek Job*

# Digging Where All Other Methods Had Failed

*The 1 yard Sauerman Bucket coming up out of Clear Creek with a heaping load.*

**This is what the manager of the Clear Creek Plant Says—**

"On October 17, we started the Sauerman slackline cableway in operation. This method of taking gravel from the river bed is proving very satisfactory and in our belief is the only way that excavating can be carried on with any degree of success at our location.

The gravel we are getting out is very solidly imbedded in quicksand, but with the Sauerman bucket we are able to dig to the full depth of the deposit, which is 27 ft. in places. We have no trouble whatever in making the bucket nose into the material and fill quickly. We are especially pleased with the Sauerman two-speed electric hoist. It is smooth-running and easy to operate and handles the bucket remarkably fast."

**These excellent results have led at least to one other important Sauerman installation on Clear Creek.**

**There are some dandy digging jobs —as well as sand and gravel pit layouts—in this month's SAUERMAN NEWS. Send for a copy.**

Clear Creek, Colorado, contains an excellent gravel deposit. But, about two feet below its surface lies a strata of rock bearing quicksand —treacherous stuff that ordinary digging equipment cannot handle successfully.

One man had an idea that the deposits could be worked at profit.

He turned to Sauerman—and a Sauerman Slackline Cableway handling a 1-yard bucket over a 600-foot span, was installed—operated by a Sauerman Two-Speed Electric Hoist.

From the very first, this equipment was able to operate at a profit —going down as far as 27 feet through the treacherous quicksand formations.

This installation illustrates the adaptibility of Sauerman Cableway Excavators—and their ability to handle the toughest of digging jobs.

Quicksand digging—underwater digging—rough ground digging—and similar work hold no terrors for them.

In addition, Sauerman Cableway Excavators perform three distinct operations:

**They dig—They carry—They lift—**

And one man, the hoist operator, is all the gang needed to handle the three.

Wherever excavating is to be done over a relatively large area—wherever the material must be lifted and conveyed over a distance of from 200 to 1,000 or more feet—Sauerman Cableway Excavators show the lowest possible costs per yard—and for the investment, the greatest digging speed.

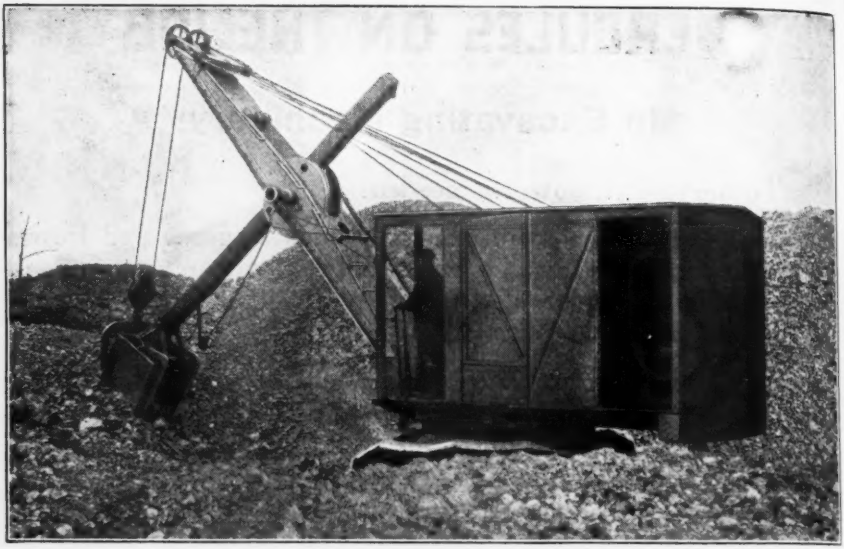
For those reasons, Sauerman Cableway Excavators are chosen for such work as the Clear Creek job—for sand and gravel pit digging—for stripping overburden—for reservoir excavating and cleaning—for levee building—and for similar digging projects.

For a more detailed picture of the types of work on which Sauerman Cableway Excavators are saving money, send for this month's issue of the **Sauerman News.** It shows details and layouts on a number of jobs.

Just ask for this month's **Sauerman News.**

**SAUERMAN BROTHERS, INC.**
**434 S. Clinton Street, Chicago, Illinois**
*Representatives in 29 Principal Cities*

**SAUERMAN**
**SLACKLINE CABLEWAYS : POWER DRAG SCRAPERS**



# Here it is—The Big Surprise

## For Users of Power Shovels, Clamshells and Draglines

# The LORAIN 75

## The Gasoline Machine that Really Meets Today's Needs

WEIGHS but little more than ¾ yard shovels, yet has the power and working capacity of 1¼ yard machines. Requires no more clearance room for house, rear end swing or boom radius than a ¾ yard, yet has the digging and dumping range of the larger machine.

Has a surplus of power, more than is required, yet possesses strength throughout greater than any strain that this surplus power can develop. You can stall the engine (powerful as it is) without over-straining any part. Permits operating speeds up to any limit that will be found practicable.

Light as it is, has ample stability for shovel service with dipper of 1¼ yard capacity and crane booms up to 50 feet in length.

Has three lever control and requires no greater physical effort by operator than a steam machine. All parts unusually accessible for lubrication and adjustment and easily visible for observation.

These and many other advantages are secured by new and unusual methods which so simplify the mechanical movements and cut down the number of parts that less attention is required and much longer life is assured.

And—— It's mounted on the Center Drive Truck.

**Send for Further Details**

THE THEW SHOVEL COMPANY, LORAIN, OHIO

Pit and Quarry

# Index to Advertisers

Vol. 11 CHICAGO, ILL., FEBRUARY 15, 1926 No. 10

# Pit and Quarry

*A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.*

*Subscription price $5.00 per year. Single copies 25c.*

Vol. 11 CHICAGO, ILL., FEBRUARY 15, 1926 No. 10


## FEATURE CONTENTS



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*Secretary*

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Pit and Quarry

Vol. 11 Chicago, Ill., February 15, 1926 No. 10

# What Are Your Costs?

DURING the recent convention of the National Crushed Stone Association at Montreal, it was our pleasure to be present at many informal group discussions at which some valuable data on production methods were exchanged. However whenever an inquiry on costs came up the questioner was seldom satisfied. The reply was evasive, uncertain or denied the questioner the information. The frequence of questions relating to costs were interesting because of our personal knowledge of the individual plants concerned in several of these discussions. Some of these individuals do not know their own costs. Private discussions with seventeen individuals revealed the amazing fact that no two of them agree in their explanation of what costs are. Because we believe that the use of standard costs provide a most valuable stabilizing executive control we shall venture to present our interpretation.

First let us inquire, what are costs? You hear of actual costs, predetermined costs, standard costs, etc., until your head quite naturally swims with confusion. In our observation, experience and study we find actual costs are not only rarely found but that they are of little use and selling prices are seldom if ever determined by what can be truthfully called actual costs.

When discussing the subject of costs it is necessary to know just what approach is being made. The costs of the finished product are one thing while the costs of individual operations based upon performance in that operation are entirely different. As an example, when a plant generates its own power, the cost per kilowatt hour should be known, but this has no relation whatever to the finished product. The indirect expense or "burden" of a producing department is often best measured by its relation to the direct or producing hours actually involved in manufacturing the product. But here again the figuring of this particular element of cost is considered, determined and controlled entirely aside from any consideration of what product is actually being made.

Costs should be so arranged that they serve as a real guide, both to the foremen or superintendents who are directly responsible for the different operations as well as to the executive management which must judge the efficiency shown by the various foremen or superintendents. Because of this a cost system which merely shows month by month what occurred is of little value as compared to a system which shows how the actual monthly costs compare to a standard cost which should be reached. Standard costs may be considered as the cost which should be reached under the conditions of operation which prevailed at the time the work was performed. As an example, at 60 per cent capacity, each operation in the plant should produce at a certain standard cost. The actual cost compared to this standard gives the executive management a trustworthy control of his organization.

The term "predetermined cost" is used generally for the costs of all operations based on capacity or normal operation. This cost is the basis of determining selling prices. It may be that normal operation is not plant capacity. The plant must be assumed to run at a certain rate of production in determining the selling price. In such a determination the plant should be considered to be operating at capacity because the cost of idle plant and equipment cannot be charged to customers through selling prices for the plain reason that customers will not pay such prices. Many producers believe that the customer pays for the idle time of winter shutdown, delays, etc. If a comparison is made with other industries and some of the more modern plants in relation to unit profit the truth will be quickly revealed that the producer is carrying the load.

Standard costs or the costs of the various operations, with a direct labor

and a direct material cost set on each operation, furnish a stabilizing executive control which cannot be attained by any other method. Budget control is not effective unless standard costs have been established because the two are inseparable. The standard costs at varying capacities are necessary because this data is needed for proper budgeting. Only when this combination is effected will there be a control which eliminates guess work and establishes instead a correct measure of the efficiency of each operation.

The important fact is that stabilized executive control requires that performance be judged by comparison with trustworthy standards. The executive must provide the system by which the standards can be determined with the advice and counsel of everyone concerned. This procedure will result in executive control becoming effective.

## T. R. Barrows

MANY readers of Pit and Quarry will be grieved to know that T. R. Barrows, executive secretary of the National Sand and Gravel Association, died at Atlanta, Georgia, on January 31, 1926. Mr. Barrows contracted influenza during the recent Tenth Annual Convention of the National Sand and Gravel Association at Atlanta. He was removed to the Davis Fischer Hospital on Thursday, January 21st. A number of prominent Atlanta physicians were called and everything possible done. The funeral was held at Hendersonville, North Carolina, on Wednesday, February 3, 1926.

T. R. Barrows

It was on January 10, 1921, that Mr. Barrows became affiliated with the N.S.G.A. as editor of the Association's bulletin. His newspaper training served him well and the bulletin at once became a publication sought for and diligently read by all who received it. Only a year later, in the early part of 1922, the added duties of executive secretary were assumed by Mr. Barrows. His practical legislative experience enabled him to discharge his duties with marked effect.

For those who may have forgotten, let us recall that the sand and gravel industry in 1920 and 1921 was very much demoralized. The National Association was far from being a sound institution. Groups and units of sand and gravel producers were disintegrating rapidly. Frictions and misunderstandings existed to a serious extent. Compare this with the situation today and you will agree that marked progress has been made to account for the sound and unified association and the firm position of the sand and gravel industry as a whole. The part T. R. Barrows played in this change will never be fully known because his work of uniting and organizing was to a great extent with individuals. His administration both of the office of executive secretary and of editor of the Sand and Gravel Bulletin represent a record of accomplishment that should not be forgotten.

It was under the tireless direction of T. R. Barrows that the association developed to its present position of national prominence; that its membership increased annually; that it reached a position of sound finances; that it rendered the most complete service possible to every member to the fullest extent of its resources.

In all our relations with Mr. Barrows we found him to be quiet, convincing, thorough and in every instance his action was free from any political twist which is so often associated with such service as he rendered. The death of T. R. Barrows is a great loss. H. W. M.

# Invading An Already Crowded Territory Successfully Accomplished

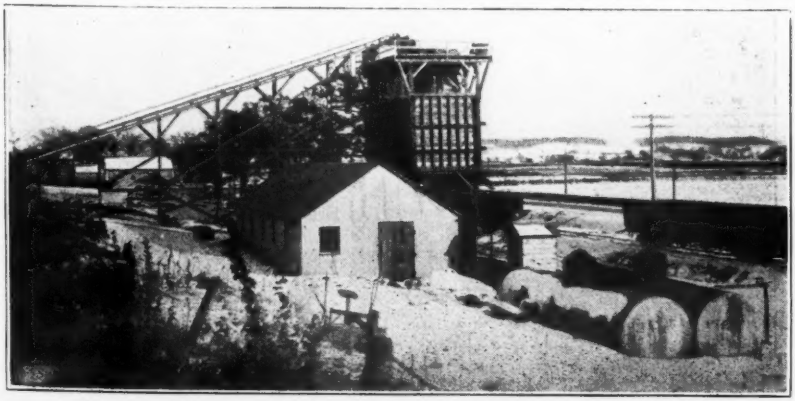
By E. D. Roberts

INVADING the already overcrowded Milwaukee market with a gravel and crushed stone plant producing 750 tons daily and marketing their full capacity from the start is the novel experience of the Hartland Washed Sand and Gravel Company. Operations were started October 1st and suspended by cold weather but due to the encouragement received, the Palmer brothers, who own the Company, have decided to double the capacity of the plant when they resume operations this spring. At the start everything was laid out with this end in view and all that is required to produce 1500 yards each shift is the installation of a second unit for the final sizing and washing.

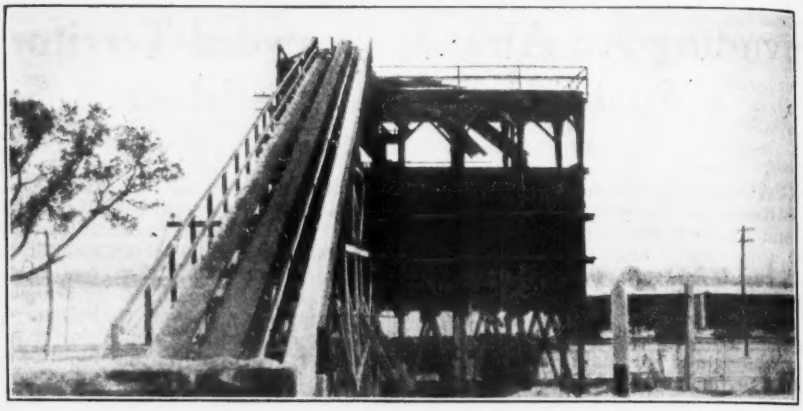
The pit of the Hartland Washed Sand and Gravel Company is located just west of Hartland, Wisconsin, which is about 25 miles west of Milwaukee on a paved state highway and alongside the main line of the Chicago Milwaukee and St. Paul railroad. A side track has been laid alongside the bunkers which are also within 150 feet of the paved highway insuring a ready access to market for their output.

During the glacial period, a moraine was laid down rising 90 feet above the plain and with only a thin coating of soil before good, clean gravel is reached. This soil covering, of about 12 inches, is scraped to one side. The material is exceptional for the Milwaukee territory in that 75 per cent of the bank is gravel and stone of which only 20 per cent has to be crushed. A small percentage of silt and very fine sand is carried in the gravel which is removed by washing. There is every reason to believe the bank is of excellent depth for a well sunk 50 feet below the plain went through this same material all the way. This assures a bank of 150 feet when the deposit is well opened up.

The gravel is excavated by a Sauerman crescent scraper operated by a 55 horsepower Wagner motor directly connected to a double drum Thomas hoist. The drag scraper discharges into a hopper leading the material to a Telsmith plate feeder which draws the material from the hopper at an even rate and discharges it onto a primary grizzley allowing the smaller sizes of stone to fall through into the boot pit of an inclined bucket elevator. The larger rock slides down the sloping bars, forming the grizzley, into a Number 8 Telsmith crusher that discharges the crushed rock to the elevator just mentioned. Both the fine and crushed material is discharged from the elevator onto another inclined grizzley which allows the fines to fall down a hoppered chute to a belt conveyor operating under this hoppered chute, onto the scalping screen and under a final crusher. The material which does not pass through the



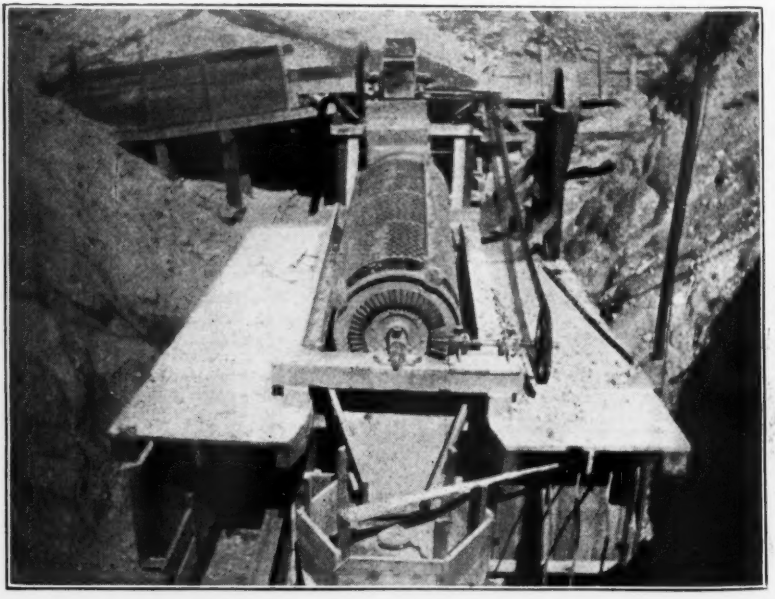
General View Showing Bunkers, Power House and Oil Storage



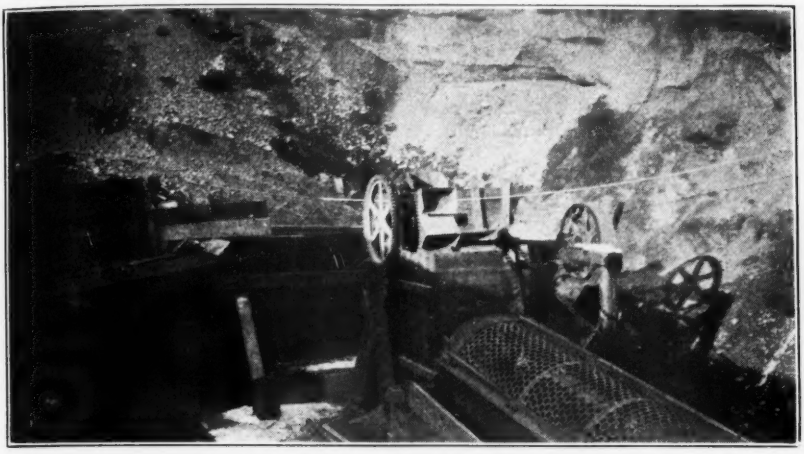
Bunkers Viewed from State Highway

grizzley slides onto a scalping screen which passes everything under 2 inches in size into a hoppered chute leading to the previously mentioned conveyor belt and discharges the oversize rock to a Number 3 Telsmith crusher. This crusher makes the final reduction. As stated before, the discharge from the grizzley, scalping screen and Number 3 crusher falls directly onto a belt conveyor. This belt conveyor operating on 195 foot centers passes underneath the state highway in a reinforced concrete tunnel 6 feet wide and 8 feet high and then up an incline to the sizing screens on top of the shipping bunkers.

As the sand and gravel enter the revolving screen, a stream of water is played on it to carry off the fine sand and silt in solution or suspension. The sand and water passes through the screen while the remainder is sorted into three grades and discharged directly into bins below. The sand and water enters two Telsmith settling tanks set in series. These grade the sand into two sizes. These two grades of sand also fall directly into bins below and make in all five



Scalping Screen and Reduction Crusher



Receiving End of Screen

grades of sand and gravel; two of sand, pea gravel, ⅝ to 1¼ inch and 1½ to 2 inch material.

There is a spout directly underneath each bin for truck shipments while five movable sloping spouts on the railroad side of the bunkers direct the sand and gravel into cars for rail shipments.

The sizing screen was placed over one side of the bunkers to allow another unit to be installed later for doubling the output of the plant. The present pump is to be replaced by one throwing 1,000 gallons a minute when the other screen is added. These pieces of equipment and changes are all that are required for the increase.

The dirty water from the settling tanks is led to a marshy area down the railroad track where the material in suspension is deposited thereby reclamiing it for use.

Several handicaps had to be overcome in the construction of the plant,

Tunnel Under Concrete Highway for Conveying Gravel to Bins

End View of Bunkers Showing Loading Facilities

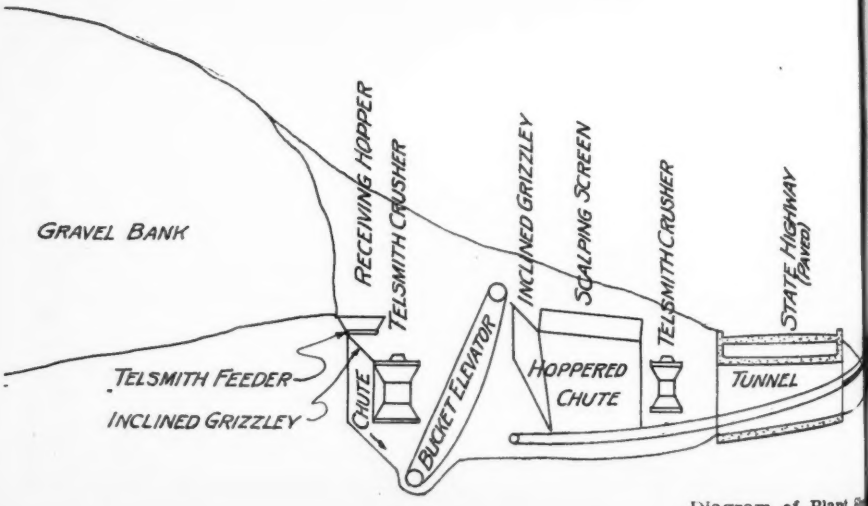
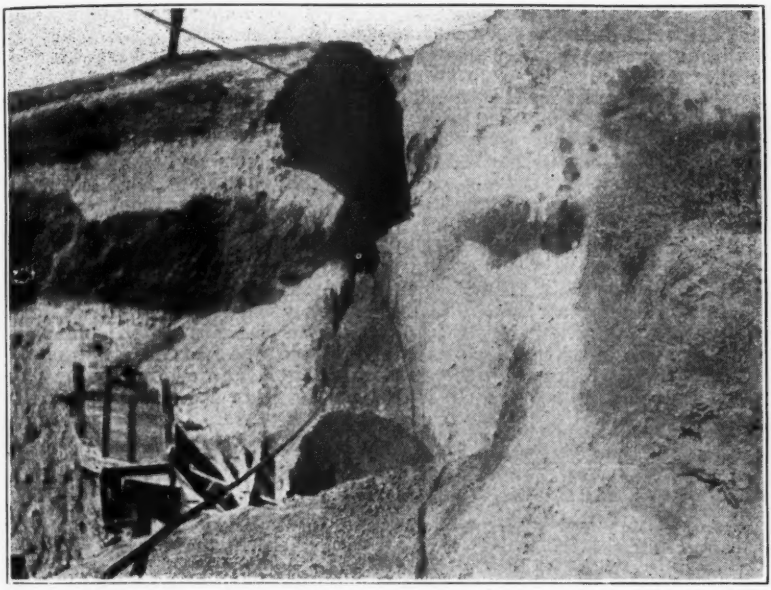
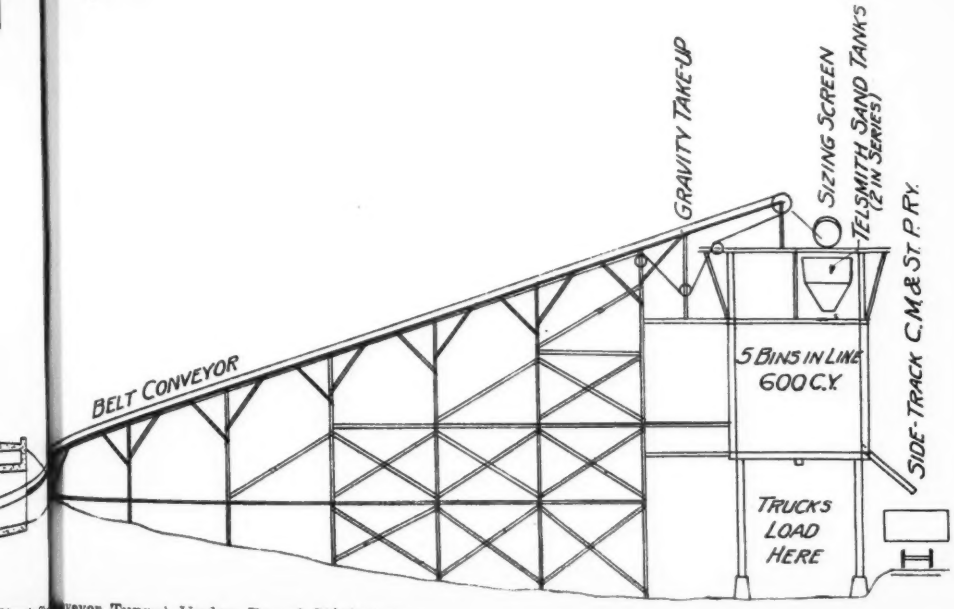



Diagram of Plant S[illegible]veyor



Bottomless Scraper on the Job

one of which was the necessity for generating electric power. No lines carrying the desired voltage and quantity were within reach and the electric company requested an enormous sum to construct a line to the plant side. Accordingly the Palmer brothers installed a 260 horsepower Buckeye semideisel engine driving a 300 horsepower Allis-Chalmers 60 cycle 3 phase




Plant & ...veyor Tunnel Under Paved Highway

generator producing alternating current at 440 volts pressure. All motors used throughout the plan require 440 volts alternating current so no transformers were required. Alternating current was adopted so that in case a line was constructed at some future time, power could be purchased if desired.

The plant has shown remarkable efficiency as but four men are required besides the Palmer brothers to operate it. P. W. Palmer and his brother, J. E. Palmer, are highly pleased with the performance of the plant. This is generally the case where a thorough study is first made of the deposit, to ascertain all of its possibilities, and the proper machinery required to efficiently produce the desired results before active development is commenced.

## Grindstones Make Plant Walls

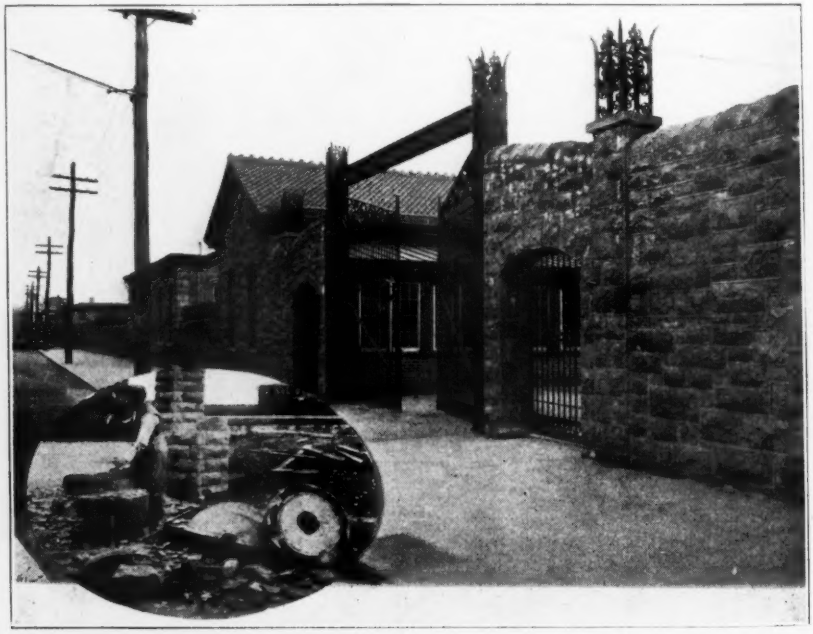
Worn out grindstones have been used in building a wall several blocks long around two sides of the 65-acre tract occupied by the plant of Henry Disston & Sons, Inc., at Philadelphia. Along a third side which fronts on the Delaware river, is a massive retaining wall also constructed of grindstones. Then, just for good measure, still more grindstones were used to build the Tacony Baptist Church, nearby.

All these stones were worn out in grinding saws and other tools in the Disston plant. More than 2,500 of them were used in building the church alone. No record was kept of how many thousands went into the wall around the plant and the retaining wall on the river front, but the total was many times as great as the number used in the church.

In constructing the retaining wall the grindstones were used just as they were discarded from the factory, but for the wall around the plant and for building the church the stones were carefully squared and no one looking at church or wall ever would imagine that they were built of grindstones.

In addition to these walls, grindstones serve as the foundation for roads within the area occupied by the 68 factory buildings that compose the Disston works. At present there are several thousand worn grindstones piled up in the factor yard waiting for some new use.

The Good Roads Machinery Company has appointed K. B. Hubbard, formerly of the Rochester, New York office, as manager of the Chicago office.



Grindstone Wall of Disston Plant; inset, Stones Being Prepared for Wall

# Compressed Air and Air Compressors

By C. H. Sonntag

PART I

COMPRESSED air as used in quarry work is an instance of those cases in which a method of power transmission, quite inefficient in itself, is used in spite of that because of its convenience, and because no better way of doing the desired thing has been found. Compressed air is an inefficient means of transporting energy. Before the days of electric central station service there were in operation in Paris and perhaps one or two other European cities large central compressor stations with pipes in the streets to which customers desiring to buy air under pressure could be connected. It was found that the better class of engines in which the air was used for power seldom returned more than 30 per cent of the power originally put into it at the compressor station. With smaller and less efficient engines the recovery was less than 10 per cent. It is doubtful whether these figures would be much improved upon today, but in spite of its apparent wastefulness compressed air is without an equal for certain services, of which those in mining and quarrying are the chief.

**Properties of Compressed Air**

Air is not a simple or elementary substance, since it is a mechanical mixture of oxygen and nitrogen in the approximate ratio of 21 to 79 by volume, with fractional percentages of water vapor, carbon dioxide and other gases. For the purpose of the present discussion, however, this composition need not be taken into account, and air may be considered to be a simple gas.

Every gas may be liquefied if the temperature is low enough and the pressure sufficiently high. It has been found by experiment, however, that for every gas there is a certain temperature above which no amount of pressure will serve to liquefy it, even though it be compressed to the same volume it would occupy as a liquid. The highest temperature at which liquifaction can occur is called the critical temperature, and the lowest pressure that will produce liquifaction at this temperature is called the critical pressure. These values for oxygen and nitrogen are shown in Table I.

C. H. Sonntag

TABLE I.

| | Critical temperature | Critical pressure |
|---|---|---|
| Oxygen | —180.4°F. | 735 lbs. per sq. in. |
| Nitrogen | —236.0°F. | 515 lbs. per sq. in. |

The existence of the critical temperature was first noticed by a Frenchman, Cagniard de la Tour, in 1822. He found that when certain of the more easily liquefied gases were confined under pressure in a glass tube under their own vapors, there was for each gas, as the temperature was raised, a point at which the boundary between the liquid and its vapor disappeared, the contents of the tube becoming gaseous without change of volume.

It has been found that in general the pressure and temperature of gases vary in accordance with certain simple laws which will be presently discussed, but experience shows also that these rules are closely followed only by those gases whose critical temperatures and pressures are far removed from those governing the conditions of the experiment. The figures given above for oxygen and nitrogen show that they meet this condition, so that for the purpose of the present study air may be considered to be a perfect gas.

**The Gas Laws**

The properties of gases were the subjects of research by a number of the early investigators of physical phenomena, probably because they could be studied with the limited and crude apparatus at their disposal. As a consequence the fundamental facts in this field have been known for many years, and from the basis of the production and use of compressed air and other gases.

**Boyle's Law**

The first of these facts was discovered by Robert Boyle, an English student of nature, in 1662. He announced in that year his conclusion, based on experiment, that the volume of a gas held at constant temperature would vary inversely as the absolute pressure upon it. This law could not be demonstrated with the apparatus and information at hand at that time unless the experimenter had a knowledge of the pressure of the atmosphere. This had been proven shortly before by an Italian, Torricelli, in 1643, who showed that the ordinary atmospheric pressure is able to support a column of mercury about 30 inches high. The construction of modern barometers is based on his work. Absolute pressure is that measured from the actual zero of pressure, which is roughly 14.7 pounds per square inch less than the atmospheric pressure to which everything on the earth's surface is subjected. Since the ordinary gauge reads zero at atmospheric pressure, absolute pressure may be obtained by adding 14.7 pounds per square inch to the gauge reading.

Boyle's law may be simply expressed by saying that if the pressure on a certain volume of gas be doubled, the volume will be halved, or conversely if the pressure be halved the volume will be doubled, always with the understanding that the temperature remains constant. It may be written mathematically $P_1 V_1 = P_2 V_2$, in which

$P_1$ is the initial absolute pressure
$V_1$ is the initial volume
$P_2$ is the final absolute pressure
$V_2$ is the final volume

The equation means that at constant temperature the product of the volume and absolute pressure of air or gas is constant. Written in the equivalent form

$$\frac{P_1}{P_2} = \frac{V_2}{V_1}$$

it means that the volume varies inversely as the absolute pressure.

Boyle's law was confirmed, with some additional refinements in procedure, by Marriotte, a Frenchman, in 1676, and is sometimes called by his name.

**Charles' Law**

It is generally known that when a given volume of gas is heated, the volume increases if the pressure is kept constant. The gas in a balloon will expand and fill the bag in the day-time when warmed by the sun, and will shrink considerably during the cool night, with consequent loss of lifting power.

The expansion of air by heat was first announced as a scientific fact by Charles, a Frenchman, in 1787, but quantitive investigation was first made by John Dalton, an Englishman, and Gay-Lussac, a Frenchman, in 1802, working independently but within a few months of each other. They found that, given a certain volume of any perfect gas at 0° C., it would expand 1/267 of its volume at 0° C. for each degree C. increase in temperature if the pressure were kept constant. Later and more careful research has shown that this fraction should be 1/273 if the temperature is measured in Centigrade degrees.

It follows that if a gas obeyed this law continuously as the temperature is decreased it would have no volume at −273° C. The least condensible gases do follow this law to very low temperatures, and for this and other reasons −273° C. is taken as the absolute zero of temperature. It has been approached within four or five degrees, but never actually reached.

The Fahrenheit degree in common use in this country is 5/9 of a Centigrade degree. The freezing point of water or the melting point of ice is 32° F. and 0° C. There are then 491 Fahrenheit degrees between the freezing point of water and the absolute zero, an interval corresponding to 273 Centigrade degrees. Ordinarily Fahrenheit temperatures may then be converted to the absolute Fahrenheit scale by adding $491 - 32 = 459°$, since the freezing point of water is at 32° F. This is the same as saying that the absolute zero is at −459° F.

This expression of the rate of expansion of air by heat is known as the Law of Charles, or sometimes as the Law of Gay-Lussac. It may be stated mathematically in this way:

$$\frac{V_1}{V_2} = \frac{T_1}{T_2} \text{ or } V_1 T_2 = V_2 T_1$$

where $T_1$ and $T_2$ are the initial and final absolute temperatures. These equations mean that at constant pressure the volume of a gas varies directly as the absolute temperature.

If instead of allowing the gas to maintain constant pressure by changing its volume we make the latter constant while applying heat, it will be found that the pressure increases 1/273 for each degree C. that the temperature is increased above 0° C. Then at 273° C. the pressure of the gas will be doubled, as will also its absolute temperature. It appears then that at constant volume the pressure of a gas varies directly as its absolute temperature, which may be written

$$\frac{P_1}{P_2} = \frac{T_1}{T_2} \text{ or } P_1 T_2 = P_2 T_1$$

Boyle, over a century before, had noted the influence of the temperature on the volume of air, but could not give numerical values to his discoveries because there was no good way to measure temperature at that time.

The laws of Boyle and Charles may be combined into one in this form:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

This means that if the volume of a given mass of gas or air is multiplied by its pressure and divided by the absolute temperature the quotient will be a constant for any corresponding values of the three measurements. We may call this quotient R, and say that:

$$\frac{P_1 V_1}{T_1} = R.$$

but since this applies to any corresponding pressures, volumes and temperatures we may write it in the more general form

$$\frac{PV}{T} = R \text{ or } PV = RT,$$

which is the general gas equation.

**Specific Heat at Constant Volume**

Suppose that we have a certain volume of gas at a known pressure and temperature, which will have a certain weight in pounds. Let us increase its temperature 1° F. while retaining it in the original space or volume. As the temperature rises the pressure will also increase according to the law of Charles, but since the volume is not allowed to change this pressure does no work, for work is measured by the product of a pressure or force and the distance through which it acts, and in this case the distance is zero. The energy supplied in the form of heat then all goes to raise the temperature of the gas. The specific heat of a substance is defined in the units in common use as the amount of heat required to raise the temperature of a pound of that substance 1° F. Many experiments have shown that the specific heat of air under the above condition of constant volume is 0.171 BTU per pound. It is usually denoted by the symbol $C_v$. (The British Thermal Unit, abbreviated BTU, is the amount of heat required to raise the temperature of one pound of water from 39.1° to 40.1° F.)

**Specific Heat at Constant Pressure**

Suppose that, as above, we have a certain volume of gas at a known temperature and pressure. Let us raise its temperature 1° F., and at the same time keep its pressure constant by permitting it to expand a sufficient amount, as in a vertical cylinder under a frictionless piston of constant weight, in a balloon against the pressure of the air, or in any other convenient way. It will be found that we must supply more heat than before, for we must furnish enough energy in this form, not only to heat the gas, but also to do the work of moving the weight of the piston a certain distance against gravity or expanding the balloon against the pressure of the air. The added heat may then be considered to be in two parts—the first, that needed to heat the gas at constant volume, or $C_v$, and the second, the equivalent of the external work done in expanding the gas against a resistance. The sum of the two per pound of gas is called the specific heat at constant pressure, and is denoted by $C_p$. For air, the value is 0.241 BTU per pound.

**Two Kinds of Compression**

All of us who have pumped up an automobile tire by hand have noticed that one of the things that gets hot is the pump cylinder. One would at first think that this is due to the friction between the plunger and the cylinder, but it has been shown in many ways that the rise in temperature is caused by the compression of the air. Of course the same thing

occurs in power-driven compressors on a much larger scale, and so all such machines embody some provision for dissipating a portion of this heat and keeping the temperature of the parts low enough for proper lubrication.

Theoretically air may be compressed in two ways, according to whether the heat of compression is all retained in the air or whether it is completely dissipated during compression.

**Adiabatic Compression**

Suppose that compression is accomplished by a cylinder and piston made of such material that they will neither absorb or transmit heat. At the end of compression the air will retain such heat as is produced, none having been lost. Such compression is called adiabatic, from Greek words meaning "without transference," in this case meaning without transfer of heat. Of course such conditions can not be fully realized in practice, but they are more or less approached in some types of compressors.

As compression proceeds the volume decreases according to Boyle's law, but the temperature increases, causing the air to exert a greater counter-pressure against the piston than it otherwise would. In consequence the expression:

$$\frac{P_1}{P_2} \quad \frac{V_2}{V_1}$$

must be modified in some way that will take into account the heat retained in the air. It has been found that the equation may be re-written in the form

$$\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^k$$

where k is the ratio of the specific heat at constant pressure to that at constant volume, or $\frac{C_p}{C_v}$. For air this ratio is $\frac{.241}{.171}$ or 1.41, so that conditions during the adiabatic compression of air may be expressed by the equation $\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^{1.41}$

**Isothermal Compression**

In contrast to the above state of things suppose that the cylinder and piston are perfectly transparent to heat, so that the latter is dissipated as rapidly as it is developed. The air will then be compressed at constant temperature, and will follow Boyle's law exactly. The process is said to be isothermal, from Greek words meaning "equal heat." Such an ideal state of affairs can not of course exist in any actual machine.

The bearing of these theoretical studies on the results obtained in commercial operation may be best shown

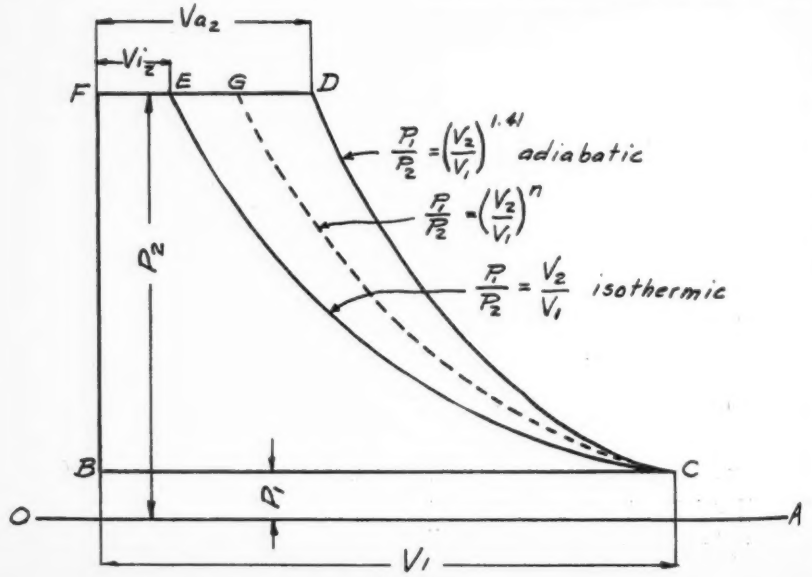



Fig. 1.

with the aid of an elementary indicator diagram, Fig. 1.

In this diagram OA is the vacuum or zero pressure line, BC is at a distance above OA representing the initial pressure $P_1$ and its length represents the stroke of the piston, while FED is at a distance $P_2$ from OA corresponding to the discharge pressure.

As the piston moves from C towards B, if compression is isothermic the pressure will increase in the manner shown by the curve CE, while if the process is adiabatic the retained heat will cause the pressure to rise more rapidly, as shown by the curve CD. Every engineer knows that the work done in a cylinder is proportional to the area of the indicator diagram, and it follows that the adiabatic compression of a given volume of free air to a stated pressure requires more power than if compression could be carried out isothermally. This can not be attained in a commercial machine, but where high efficiency is aimed at every opportunity for cooling the air during compression by water-jacketing the cylinder walls and heads is utilized. The result is that compression proceeds along such a curve as CG, and is expressed by the equation $\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^n$ where n varies from 1.35 to 1.25. The high value applies to modern high-speed compressors, while the lower is possible in a slow-speed low pressure machine. It has been found that as a dollars and cents proposition it pays to sacrifice something in the efficiency of the air cylinder for the sake of the lower investment in compressor and floor space obtainable by the use of high-speed machines.

The diagram does not take into consideration cylinder clearance or re-expansion, but serves just as well to illustrate the difference in the two kinds of compression. Table II[a] shows the power saving that would be possible if true isothermal expansion could be accomplished. The attainable power consumption will be between the values given for adiabatic and isothermal operation.

(a) Ingersoll-Rand Co., New York.

### O. & S. Change Name

The corporate name of Orton & Steinbrenner Company, 608 South Dearborn street, Chicago, with factory at Huntington, Indiana, has been changed to Orton Crane & Shovel Company. No change in the ownership, management or officials is involved; the reason for the change in name being to describe better the company's principal activity which is the manufacture and sale of locomotive cranes, crawling tread cranes, gas, electric and steam shovels, draglines and grab buckets.

TABLE II

Single-Stage Compression—Jacket-Cooling Not Considered

| Gauge Pressure Pounds | Absolute Pressure Pounds | Isothermal Compression | | Adiabatic Compression | |
|---|---|---|---|---|---|
| | | Mean Effective Pressure | H.P. | Mean Eff. Pressure Plus 15% Friction | H.P. Plus 15% Friction |
| 50 | 64.7 | 21.80 | 0.095 | 31.31 | 0.136 |
| 55 | 69.7 | 22.95 | 0.100 | 33.23 | 0.145 |
| 60 | 74.7 | 23.90 | 0.104 | 35.10 | 0.153 |
| 65 | 79.7 | 24.80 | 0.108 | 36.91 | 0.161 |
| 70 | 84.7 | 25.70 | 0.112 | 38.59 | 0.168 |
| 75 | 89.7 | 26.62 | 0.116 | 40.25 | 0.175 |
| 80 | 94.7 | 27.52 | 0.120 | 41.80 | 0.182 |
| 85 | 99.7 | 28.21 | 0.123 | 43.27 | 0.189 |
| 90 | 104.7 | 28.93 | 0.126 | 44.71 | 0.195 |
| 95 | 109.7 | 29.60 | 0.129 | 46.12 | 0.201 |
| 100 | 114.7 | 30.30 | 0.132 | 47.46 | 0.207 |
| 110 | 124.7 | 31.42 | 0.137 | 50.09 | 0.218 |
| 120 | 134.7 | 32.60 | 0.142 | 52.53 | 0.229 |

# Lime in 1925

The lime sold in the United States in 1925 amounted to 4,510,000 short tons, valued at $42,530,000, according to estimates furnished by lime manufacturers to the Bureau of Mines, Department of Commerce. These figures show an increase of 11 per cent in quantity and 7 per cent in value over the sales in 1924. The sales of hydrated lime, which are included in these figures, amounted to 1,505,000 tons, valued at $14,926,000, an increase of 14 per cent in quantity and 13 per cent in value. The average unit value of all lime showed a decrease from $9.72 a ton in 1924 to $9.43 in 1925, and that of hydrated lime a decrease from $10.03 a ton in 1924 to $9.92 in 1925.

Ohio, the leading State, showed an increase of 13.5 per cent in total sales and 14 per cent in sales of hydrated lime. Pennsylvania, which ranked second, showed an increase of 12.5 per cent in total sales. Of the 22 States in which more than 25,000 tons were sold, only 3 showed decreased sales.

Sales of building lime were about 2,365,000 tons, an increase of 9 per cent. The estimated sales of chemical lime for 1925 were 1,885,000 tons, an increase of 14 per cent. The dead-burned dolomite reported as sold for refractory is estimated at 375,000 tons compared with 328,659 tons in 1924. The demand for lime for use in agriculture was somewhat better in 1925 than in 1924, and the sales are estimated at 260,000 tons, an increase of 5 per cent.

## Link Belt Crawler Booklet

The new All-Purpose Crawler Crane Book No. 895 just issued by the Link-Belt Company, is one of the most complete ever published. The book contains 48 pages, generously illustrated to show the use of the drag-line, dipper and trench shovel, skimmer scoop, hook blocks and pile drivers.

Data on lifting capacities, approximate operating speeds, line pull, tractive effort, etc., are given. The tables in which this data is arranged have been supplemented by line drawings which show dimensions for operating limits.

Information is given on some of the usual, as well as the more ingenious uses to which the various types of cranes can be put.

**Lime Sold by the Producers in the United States in 1924 and 1925**

| State | 1924 | | | 1925 (estimated) | | |
|---|---|---|---|---|---|---|
| | Hydrated lime (Short tons) | Total lime | | Hydrated lime (Short tons) | Total lime | |
| | | (Short tons) | Value | | (Short tons) | Value |
| Ohio | 654,763 | 934,407 | $9,511,270 | 745,000 | 1,061,000 | $10,664,000 |
| Pennsylvania | 189,431 | 700,431 | 5,634,806 | 210,000 | 788,000 | 6,434,000 |
| West Virginia | 44,841 | 238,714 | 1,884,682 | 52,000 | 295,000 | 2,095,000 |
| Missouri | 60,651 | 243,465 | 2,354,175 | 74,000 | 272,000 | 2,605,000 |
| Wisconsin | 18,246 | 235,030 | 2,129,701 | 21,000 | 243,000 | 2,140,000 |
| Massachusetts | (a) | 194,402 | 2,693,028 | (a) | 195,000 | 2,520,000 |
| Virginia | 38,001 | 172,776 | 1,409,447 | 50,000 | 190,000 | 1,460,000 |
| Alabama | 23,465 | 204,059 | 1,812,282 | 27,000 | 180,000 | 1,550,000 |
| Tennessee | 44,242 | 144,292 | 1,111,781 | 43,000 | 177,000 | 1,318,000 |
| Indiana | 44,697 | 116,927 | 991,003 | 43,000 | 126,000 | 1,022,000 |
| Maine | (a) | 125,688 | 1,809,929 | (a) | 117,000 | 1,600,000 |
| Illinois | (a) | 89,132 | 934,199 | (a) | 98,000 | 1,017,000 |
| New York | (a) | 98,592 | 991,799 | 22,000 | 94,000 | 906,000 |
| Michigan | (a) | 73,096 | 702,072 | 10,000 | 91,000 | 874,000 |
| Texas | 25,496 | 60,565 | 570,334 | 29,000 | 70,000 | 678,000 |
| Vermont | (a) | 56,484 | 710,739 | (a) | 69,000 | 741,000 |
| California | (a) | 59,583 | 658,138 | 13,000 | 66,000 | 857,000 |
| Connecticut | (a) | 58,851 | 796,541 | (a) | 63,000 | 762,000 |
| Maryland | 29,134 | 56,178 | 470,105 | 38,000 | 59,000 | 500,000 |
| Arizona | (a) | 27,972 | 331,756 | (a) | 46,000 | 460,000 |
| Washington | (a) | 28,188 | 353,450 | (a) | 29,000 | 355,000 |
| Minnesota | (a) | 25,764 | 319,066 | (a) | (a) | (a) |
| | 143,697 | 127,455 | 1,416,120 | 128,000 | 181,000 | 1,972,000 |
| Undistributed | 1,316,664 | 4,072,000 | $39,596,423 | 1,505,000 | 4,510,000 | $42,530,000 |

(a) Included under "Undistributed."

# The Human Element in Plant Operation

By A. B. Mack

Ass't Gen. Mgr. Kelley Island Lime and Transport Co.*

THE success of an organization depends upon the human element from the executive down through the subordinates to the actual workmen. The executive's success or failure depends greatly on the soundness of his policies in dealing with men, and his ability to radiate that policy through the rest of his organization. Many believe that only two factors are necessary to industrial success—capital and labor—but you all know that without good management the capital soon disappears and then there is no need for the labor. I do not mean that a sign on a door is all that is needed for management; it goes deeper than that, for the management must be sound in its policies in dealing with the men as well as in handling the rest of the company's business.

Foremost among the principles necessary to the solution of the problem of human element are Confidence, Justice and Truth. You are all familiar with the fact that the executives of large corporations having varied and scattered interests lost that personal contact with their employees that prevailed prior to the period of consolidation and expansion. It used to be that the management wintered and summered their employees, shared their joys and their sorrows, with the result that there existed a relationship that was invaluable both to the company and to the employees. With the coming of the large corporations the executive, having such a great amount of business to handle, had to depend upon reports—cold things at the best—and on his subordinates for his contact with the employees. Very often the subordinates, either in their zeal for a showing or from selfish motives distorted the facts in their reports, with the result that the opportunity presented itself for the agitator to get in his fine work. However, I believe that the pendulum is on the back swing now and infinite good will be accomplished in the coming years to re-establish a proper relationship.

*From a paper presented before the ninth annual convention of the National Crushed Stone Association on January 20, 1926.

When I said confidence is one of the essentials, I mean that the employer must have the confidence of his employees, and those subordinates whose duty it is to administer the company's affairs with the employees must gain the confidence of those directly under them. There may be different ways to gain this confidence, but the way to gain it and hold it is by Justice. Remember that you are the judge and jury in the maintenance of a proper relationship between the company and its employees. You need the confidence of your men and you must be fair and just to your company and fair and just to your men in all matters that come up for your decision.

By truth I mean that it is absolutely necessary that truthfulness and honesty be cultivated. Truth is fact, and as a very able man recently said "To take the hazard out of business, get the facts."

You will note that I have placed the burden upon the employer in order to accomplish the proper relationship between employer and employee. The employer, manager or executive is the outstanding personality in any organization and you will not often find the subordinates or employees rising about their superiors in the maintenance of principles. The average of employees has not undergone any great change, contrary to the often expressed idea that you cannot get as good men today as you could years ago. We have found that the workmen of today have just as much pride in accomplishment and goodworkmenship as they ever had. This is one of the human element problems that many worry about. To illustrate this, I might mention a plant I knew about that had about 250 men working. The operating head of that plant always blamed his poor showing onto the fact that none of his men were any good. Another man finally took charge and with the same organization except that he reduced the force to less than 175 men, immediately turned the plant from red figures to black figures. Here the human element had failed, but the failure was not with the men, it was with the

management. You can spend millions for plant and equipment but you have to get back to the human element for ultimate success.

It is true that it is necessary to properly compensate an employee for his work. The best results are gained when the employee is happy in his environment and free from financial worry. The men are usually fair and it is usually when you have neglected them that they are led to do foolish things.

Intelligent discussion of important problems of wages and working conditions will ordinarily dispose of such matters to the satisfaction of both employer and employees. It is obvious that one man cannot discuss such matters with a mob, and for this reason they should be discussed between the management and a selected committee of the employees, the committee to be selected by the employees and in whom they have the same confidence that the stockholders have in the management.

None of these matters that I have mentioned depend for their success upon the sacrificing of either discipline or efficiency. The sacrificing of either will destroy the confidence of the employees in the management.

One of the very important means by which the principles I have stated may be maintained is the establishment and operation of the seniority rule in filling vacancies and making promotions. You are no doubt all familiar with it but I believe it is a matter that is frequently misunderstood. Seniority puts hope and industry into your men. It takes away from the lesser supervisory men the opportunity to break down your organization by playing favorites or settling grudges. A rule of seniority in its practical operation will get a man a better job, but only that man's own ability will hold it for him. It takes time to get it working properly because individual cases will arise that need special handling, but once in force and practiced as it should be, it will work wonders with one of your very serious problems—labor turnover.

All of these things I have talked about are practical—they are practiced in what we take pride in believing is a successful organization. You all have ideas that you have worked out and I am sure we can all profit by hearing about them from you.

## Haiss Traction For Fordson

The Haiss Traxion Chassis for the Fordson has been brought out by the George Haiss Manufacturing Company. The manufacturers claim it combines Fordson economy with the pulling power and sure traction of the Haiss creeper tread mounting and the machine is especially adapted for heavy duty work including excavating, heavy hauling, road building, grading and ditching.

The Traxion Chassis is of all steel construction. The frame is of 7 inch channel members hot riveted and rigidly braced. Three points suspension relieves the frame and power plant of all strains. A heavy 13 leaf spring in the front cross member absorbs shocks and jars. A Baldwin roller chain drive is used.

The machine has double creeper belts of the heavy duty type. Each consists of a structural steel frame with sprocket at one end and idler at the other with three carrying rollers between and a chain tread. The tread plates are electric steel castings of an overlapping solid faced design and are driven through the link pin housing. The rear end of the creeper unit is carried on the drive axle and is connected by an equalizing spring member.

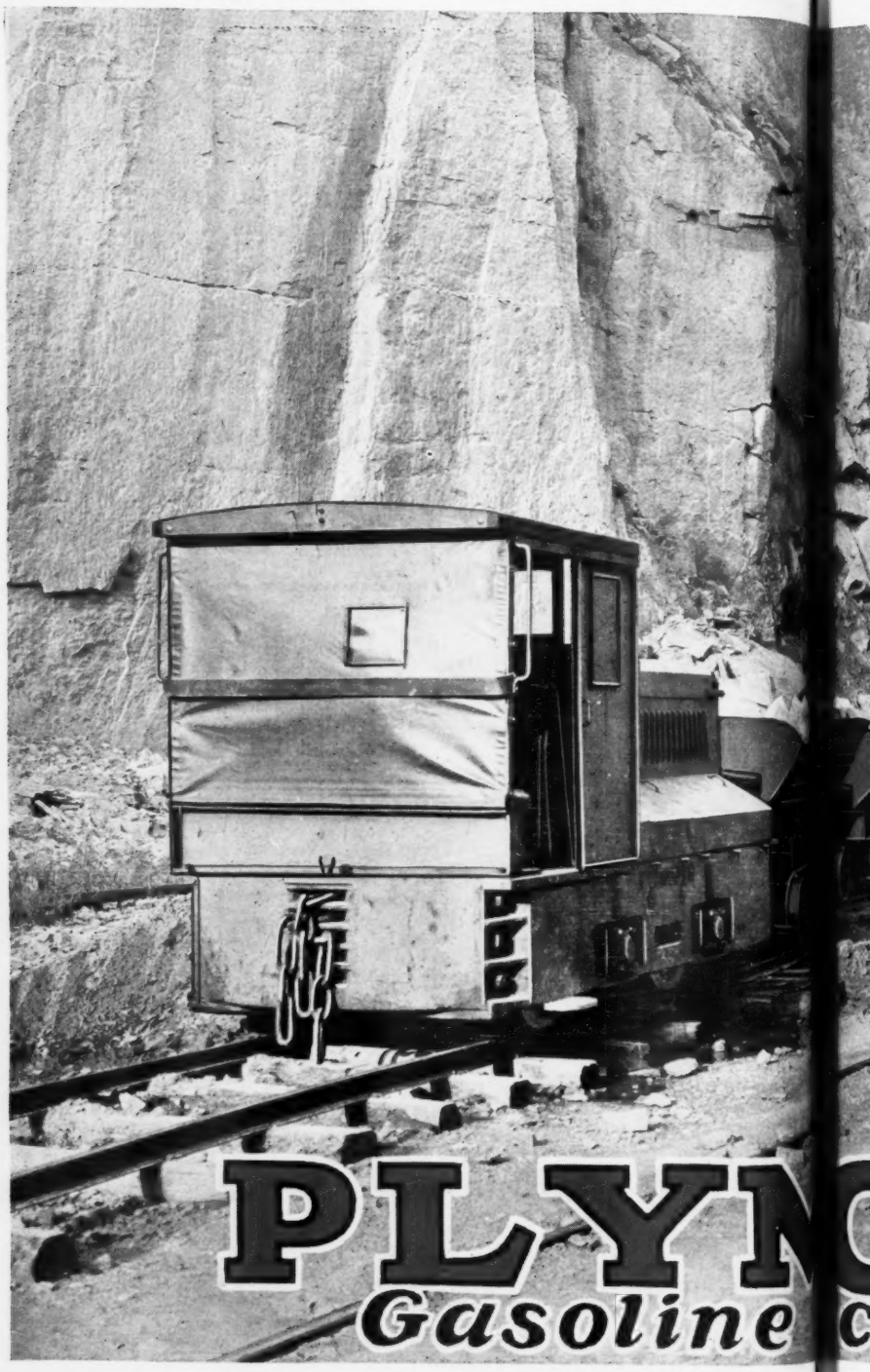
The drive is by sprockets which key on the rear axle in place of Fordson wheels, by roller chain to sprockets on the creeper rear axle. The machine has a draw bar pull of 15 h.p.

## New Mundy Automatic Brake

G. L. Dilly, chief engineer of the J. S. Mundy Hoisting Engine Company, has just announced the design of the new automatic brake, which is to be built on all future gasoline and electrically driven hoists made by the concern. This brake consists of a rim wheel keyed on the intermediate shaft of the hoist, upon which an asbestos lines brake is mounted.

The differential spool and spring mechanism shown in the photograph causes the brake to grip the wheel so that it is impossible for the load to descend or the drum shaft to reverse. Under test the brake held the rated load without slipping. When the rim wheel is revolving in the hoisting direction, the automatic brake idles.

The gasoline hoist upon which this brake was mounted was run continuously for two and one-half hours. During that time there was no heating of the brake.


PLYM
Gasoline

# An Efficient Material Handling System Keynote to Service in This Instance

STARTING on March 10th of 1923 with a half yard Sauerman scraper excavating and stripping for a sand and gravel deposit, and developing a business which has grown until today this one-half yard Sauerman scraper has been replaced by a Sauerman 1½ yard scraper because the market demand required production of 600 yards of material per day, shows rapid development. This growth was experienced by a sand and gravel operation near Schenectady, New York, owned by Neal F. Ryan. The development and management of this plant has been under the direct supervision of G. N. Dulin, engineer and manager, who had the initial plant ready for operation in seven months. The sand and gravel plant is located in Scotia, New York, across the Mohawk River. A brick plaster and asphalt sand plant is also operated by the same organization in Schenectady, N. Y., with a capacity of 300 yards per day.

At the present time a Sauerman 1½ yard scrpaer operated by a Sauerman double drum two-speed hoist which is driven by a 75 h.p. General Electric A. C. motor hauls material into the plant. The present scraper operates over a 300 foot span and discharges the material hauled into a field hopper with a capacity of 8 cubic yards. Material is fed from this field hopper by a 30 inch by 6 foot Stephens-Adamson feeder to a 24 inch by 160 foot Stephens-Adamson belt conveyor which in turn discharges to the scalping screen 42 inches in diameter and 12 feet in length. This scalping screen is equipped with a dust jacket 60 inches in diameter and 7 feet in length. A 10 inch Allis-Chalmers and a 6 inch special reduction Allis-Chalmers crusher handle the product from the scalping screen. The 10 inch crusher is driven by a 50 h.p. General Electric motor while the 6 inch crusher is driven by a 40 h.p. of the same make. Both of these crushers discharge to a 24 inch by 20 foot Stephens-Adamson belt conveyor which in turn discharges to the foot of the 16 inch by 60 foot centers Stephens-Adamson bucket elevator. The conveyor belting is Goodyear throughout the plant. This bucket elevator lifts the material to the head box feeding to the right at the top of the plant. The feed from this box is by gravity to the 42 inch by 20 foot Stephens-Adamson cylindrical screens. Four sizes of stone are produced in this screen: ½, ¾, 1½ and 2 inches. These sizes are discharged directly to separate bins with a total capacity of 200 yards. The rejects from this screen are returned to the 6 inch reduction crusher. The ⅝ inch product which is discharged from the first 6 foot section of the screen passes over a 3 by 8 foot Universal vibrating screen with $\frac{3}{16}$ inch square mesh, driven by a one h.p. motor at 1,800 r.p.m. This screen sizes the material from $\frac{3}{16}$ to ½ inch. The dust from the Universal screen is elevated and joined with the sand and water as it enters the wash box.

The material from inch gravity to sand, as it comes from the scalping screen, passes by gravity to a 16 inch 60 foot centers Stephens-Adamson bucket elevator which lifts it to the head box feeding to the left at the top of the plant. This elevator is

View Looking at the Plant From One End of the Deposit

An Excellent View of the Plant Pit

parallel to the crushed stone elevator which feeds to the right. The sand and gravel passes from the head box by gravity to a 42 inch by 10 foot Stephens-Adamson cylindrical square wire mesh screen with ⅜ openings. A stream of water piped 300 feet through a 4 inch line is added in the head box and washes the sand and gravel in its path to the screen. Another stream of water is added as the material strikes the screen. A perforated pipe running the length of the screen on the inside provides a final rinsing. The sand and water drop to a 4 by 18 foot Good Roads wash box for final separation. The sand and gravel is discharged directly to storage bins. There are three bins for this storage. One is for one inch gravel, another is for concrete sand while the third is for sand and gravel mixed. These bins have a combined capacity of 150 yards.

The total bin storage has a capacity of 350 yards. They are 55 feet long and 24 feet in height from the bin floor and 36 feet from the ground. A

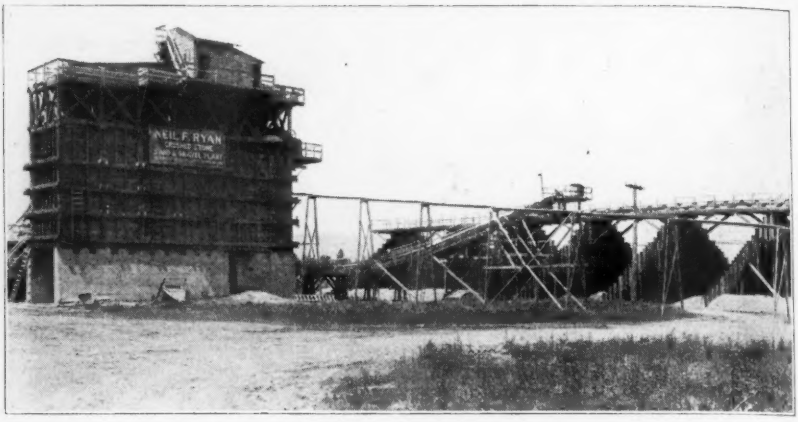
The Discharge of the Scraper and the Conveyor to the Plant

Outside Storage System

concrete driveway under the bins permits easy access and facilitates loading. Stairways and runways to every part of these bins and also to every part of the crushing and screening plant are a feature which gives easy access. The inside width of these bins is 12 feet 6 inches. Each of these bins is equipped with Stephens-Adamson 12 by 18 inch duplex cut-off gates for loading trucks.

This bin storage is supplemented by an outside storage system which has a capacity of about 10,000 yards. A storage conveyor 165 feet long and 18 inches wide carries the material from the plant and elevates it a height of 32 feet to a head box which in turn feeds an 85 foot reversible shuttle conveyor 18 inches wide mounted on a track. This shuttle conveyor distributes the material to any one of seven storage sections. This material is reclaimed from storage to trucks by two Haiss loaders with a caterpillar propellor feed of a yard a minute capacity. A Universal truck crane is sometimes used in this service. The Uni-

Belt Conveyor to the Storage Distributing System



The Storage Bins

versal machine however is generally kept busy moving from one stock pile to another and for loading railway cars at the railroad which is some distance from the plant. Only a small portion of the production is shipped by rail.

A fleet of 30 trucks handles the distribution of the product. Twenty-two of these trucks are equipped with Heil dump bodies. Twelve of the trucks are Macks, two of which are 5 yard, seven 4 yard and three 3 yard. Eight of the others are one ton Fords. There is one 2 yard Seldon roadmaster.

This company has built a reputation during its short period of operation for rendering service both as to delivery and a well graded and washed product meeting all requirements. A very attractive piece of advertising literature distributed by this company came to our attention in which the necessity of using a washed product was excellently presented.

### George Haiss Dies

George Haiss, president of the George Haiss Manufacturing Company, New York, died of apoplexy, January 11, 1926. He was born at Bethel, New York, April 22, 1859. In 1892 Mr. Haiss organized the George Haiss Manufacturing Company, builders of material handling machinery. Among Mr. Haiss' better known inventions and patents are clam shell buckets, coal hoisting towers, continuous elevator and bucket conveyors, belt conveyors, and truck loaders. He was also president of the Haiss Realty Company, New York. He is survived by his widow, three sons and a daughter.

The Trucks Lined Up for Parade

# Insurance Against Windstorm

**By Dwight Ingram**

THERE was a certain merchant in our town who had a reputation of having a fire every season that his business was unprofitable. In fact, his record had become so well known that no good insurance company would give him a dollar's worth of protection. One day a young insurance agent, ignorant of the community, called on this man and offered to sell him windstorm insurance. The merchant, getting over his surprise that anyone would want to sell him insurance of any kind, finally stammered:

"My boy, what do I need of windstorm insurance? How could I start a cyclone?"

Yes, windstorm insurance, or as it sometimes is called, tornado insurance, is useless to the unmoral man who tries to "sell out to the insurance company" when times are bad. But next to fire and liability, it is the most important item in a manufacturer's or producer's insurance problem.

It does not take a long memory to recall the heavy storm that swept southern Illinois and Indiana last March, killing 800 persons and damaging property to the extent of $11,000,000. Nor is it hard to recall the tornado of June, 1924, which caused a property damage of $13,000,000, centering around Sandusky and Lorain, Ohio.

But these striking tragedies do not constitute the vital argument in favor of insuring against wind damage. The figures on recent storms indicate that the entire United States is "tornado territory" and every month may be a "tornado month." During the past nine years there have been recorded 752 tornadoes in the United States causing a property damage of $92,000,000 and a loss of life of 2,242. The year 1924 was the outstanding tornado year with 124 tornadoes, causing property damage of $29,875,000, 313 deaths and 1,424 injuries to persons. June was the big storm month with $14,000,000 of damage; April being next with $5,000,000; July $4,000,000; March, $3,000,000; May, $1,500,000, and so on down the calendar. April led in number of tornadoes with 32; May was second with 24. Kansas had the greatest number of tornadoes during the year with 17, Georgia was second with 12, Alabama third with 11 and Wisconsin fourth with 9.

On industrial property windstorm insurance is almost as universally carried as fire insurance. It is needed because no community is exempt from the risk of severe winds and because such catastrophies are purely "acts of God" that are beyond human control. Then, too, tornadoes have some peculiarities that are terrifying. The Illinois storm of last March would leap from the ground and travel miles above the earth, then dip down and for a width of two or three farms would scoop everything ahead of it. Whether tornadoes come to a particular community or strike a given spot within their path is a matter of blind chance. It is for that reason that banks are almost always requiring windstorm insurance as well as fire to protect mortgages and loans over which they have control.

The buying of windstorm insurance has taken a tremendous jump this year because the insurance companies have just devised a substantial improvement in the policy form. In the past there was often a gap between the fire and wind policies in such a manner that a building that was visited by wind and fire in succession was not insured at all. This arose in the innumerable cases where wind tore off a corner of a roof or wall, causing a short circuit in electric wires or upsetting a stove, and it was the resulting fire that really destroyed the greater part of the building. In such a case the windstorm policy did not cover the loss because the major damage was done by fire and not by the wind directly. Nor did the fire policies cover, because they contain a clause that "if the building or any part thereof (such as part of the roof or wall) shall fall, except as the result of fire, all insurance shall immediately cease." This gap between the two policies caused constant friction. The policy holders felt that they had paid for protection against damage from any cause; yet the policies very clearly did not cover this risk. So at the annual conference of insurance company executives this year it was agreed that the "fire-tornado gap" would have to be bridged.

It was felt impractical to make any

change in the fire insurance policy, because this is a standard form of contract, every word of which has been interpreted by various supreme courts so that its exact meaning is established and tampering with it might unsettle some other clauses in the policy. The windstorm policy, however, being newer, is still in process of revision, and is being improved in other ways as well. The insurance companies therefore decided to add to the windstorm policies, without any additional charge, a clause stating that if wind damaged a building at all and fire resulted, the windstorm policy would cover the consequent fire loss as well as the direct wind damage. It thus works out that a firm really does not have complete fire insurance without the addition of a windstorm policy.

Until recently windstorm insurance has been misunderstood by many business men because it used to be called tornado insurance. Now it is true that every state might have a tornado but many producers like to believe that no such storm could ever hit their plant. But windstorm insurance covers not only the spectacular total loss. It also covers the partial damage that comes from severe winds which may not be strong enough to be called tornadoes. The actual insurance is against damage from any wind of "more than ordinary intensity," which phrase can be stretched to cover the simple blowing down of a sign or shutter.

As in the case of every kind of accident, winds do damage of two sorts. The direct destruction which they do is obvious. But just as real is the intangible loss resulting from the interruption of business. That is, if a producer's plant is destroyed, the profits for the coming season are gone, and the overhead expense of executives, office help and foremen goes on, for these people must be kept on the pay roll in order to keep the organization intact. This loss of overhead expense and profits during the period of re-establishing business after a disaster is probably greater than the direct property damage in the non-metallic industries. For while it is bad enough to have to rebuild buildings and buy new machinery, it might be impossible to keep an organization intact and continue profits to the stockholders during the dreary period of rebuilding. Linked to the seriousness of the business interruption loss in our particular industries is the second fact that most tornadoes, and most high winds of other degrees, come during the months from March to July. Now the destruction of the average non-metallic producer's plant in November, for instance, would not be ruinous. The ordinary windstorm insurance money would pay for rebuilding the plant, and the work could be done largely before the spring producing season opened. But if wind should destroy the plant in the spring, the whole year's business would be lost, because the rebuilding would have to be done during the height of the operating season. It is a peculiarity of our industries, therefore, that the worst time of the year for a storm is the very season when high winds are most frequent. And so it would seem that business interruption insurance against windstorms should be a vital part of every producer's insurance program.

The rates for windstorm insurance are generally lower than for fire insurance. And also the rating system or schedule is simple as compared to the complicated analysis of construction and use of buildings that are made in computing fire insurance rates. So far underwriters have only been able to distinguish a few classes in going over their loss records, with the result that the rating schedule is merely a list of rates for each class of building according to its loss experience. In speaking of the rates and rules we usually refer to those applying in the middle west, because the insurance practices there are typical of the entire country and the losses are so many that no other large section of the country has higher rates.

To give a clear estimate of the cost of windstorm insurance to those few readers who are not carrying it, we quote the following rates on certain important classes in the middle western rating schedule

| | |
|---|---|
| Ordinary industrial buildings, used as offices and shops, that are not of superior wind-resistive construction—annual rate per $100 of insurance..... | $ .20 |
| Industrial or office buildings of wind-resistive construction (this class includes all re-inforced concrete or skeleton steel fireproof buildings. The rating bureau in most states will also class as wind-resistive any other building that is especially well designed to withstand wind—rate ..... | .12 |
| Private dwellings, flats, private stables and garages—rate.... | .16 |

| | |
|---|---|
| Covered bridges—rate..... | .80 |
| Elevated tanks which are not on the roof of a building (tanks on a roof are a part of the building underneath them and are so insured)—rate..... | .80 |
| Metal smoke stacks, when insured separately and not included in general insurance on an entire building—rate..... | 2.00 |

Most policies of windstorm insurance are not written on an annual basis, but are written for a period of three or five years at a time. The rate for three years is two and one-half times the rate for one year, and the rate for five years is four times the annual figure, so that insurance for the longer terms is distinctly cheaper.

A vital factor in the buying of windstorm insurance is to decide how much to carry. The basis of loss adjustment is just the same as in fire insurance, that is, the "actual value" of the property. Actual value in insurance means simply the replacement cost, new, at today's market prices (regardless of original cost) minus depreciation or wear and tear for the time the property has been in use. The very conservative property owner, then, would determine what the actual value of his plant is, either through an appraisal or through checking over his bills for buildings and equipment, and then would insure that entire amount on the theory that it is possible for a tornado to wipe out a property completely. It is usually reasonable, however, to count on some salvage after a heavy wind. It probably is not really safe to carry insurance of less than 80 per cent of the actual value, because, since the wind policy is covering not only direct damage but also resulting fire damage, the windstorm insurance ought to be equal in amount to the fire insurance and placed in the same insurance companies so that there can be no ground for dispute as to which company shall pay any loss that may come out of a combined fire and wind. There are some buildings and some communities for which less insurance, maybe as little as 50 per cent of the actual value, is reasonably adequate, but before a producer decides to economize by reducing his insurance, he should go over his individual situation with an insurance engineer.

The question of how much insurance to carry is, of course, linked up with the co-insurance clause. At the rates quoted above it is not necessary to have any coinsurance. It would be permissible, so far as the insurance company is concerned, to carry only $1,000 of insurance on a building worth $15,000, for instance. But the intelligent business man is going to analyze his needs thoroughly regardless of what the policy may require. And when he finds that he ought to carry insurance up to 80 or 50 per cent of the value of his plant in order to get good protection, he will be told that if he will permit the insertion of a clause in his policies stipulating that he is to carry insurance equal to at least the agreed percentage (80 per cent, for example) or will bear a proportionate part of any loss himself if he fails to do so, he will be given a credit in his rate. That is the intent of the co-insurance clause. All of the above rates (except the second one, on fireproof buildings and the third one, on dwellings, etc.) are reduced 30 per cent if insurance up to at least half the value of the property is agreed to be carried; and they are reduced by 50 per cent if an 80 per cent of value agreement is made. The second class, buildings of fireproof or special wind-resistive construction, are allowed credits of 60 and 67½ per cent respectively for the 50 and 80 per cent coinsurance clauses.

Coinsurance is misunderstood by so many householders who are not business men that its use for private dwelling insurance is impractical.

Similar to the gap between the old fire and windstorm policies, there is also a weakness in the practical handling of wind insurance on account of hail. It is easy to understand in theory the difference between damage that is done directly by wind and damage that is done by hail stones, which sometimes are impelled by wind. Hail damage to buildings or machinery is not included under the policy unless an additional premium is paid at the rate, usually, of ten cents per $100 on the full amount of windstorm insurance carried. It is probable that the insurance companies will voluntarily reduce this charge within a year or two. In the meantime it is hard to advise a producer to add the hail feature to his policy for two reasons. In the first place the charge is too high for the risk, and the damage by hail is usually not great in terms of dollars anyway. And in the second place, so many

losses arise where it is impossible for either the producer or the adjuster to decide how much damage was done by hail and how much by wind, that insurance companies frequently have to pay for the hail damage whether they have charged for it or not.

In spite of its popularity, windstorm insurance lags away behind fire, liability, and even earthquake and flood insurance in the matter of scientific study to prevent loss or damage. Tornadoes and high winds are very much a matter of sheer luck, and it has been found that buildings even of a strong type of construction can be wiped flat by the irresistible force of the elements. While it is hard to get technical assistance, though, the matter of prevention of wind damage is so important that it should be considered by each producer individually. It will often be found that relocation of certain buildings will minimize the chance of their being struck by wind. Then, too, all permanent buildings should be constructed substantially, especially with walls or frame capable of resisting a wind of maximum known velocity. And finally much inconvenience and loss of time will be avoided if the producer eliminates as far as possible from his plant elevated tanks, roof structures, flimsy sheds and other small but important units that would be bowled over by a comparatively moderate wind. Through an intelligent program of preventive planning and of buying insurance correctly, any producer can safeguard himself against loss of his business due to wind or tornado damage.

## Plymouth Expand Chicago Office

Mr. Roy M. Nelson is now representing The Fate-Root-Heath Company, manufacturers of the Plymouth gasoline locomotives in the Chicago territory. Mr. Nelson's office is in the Peoples Gas Building, Chicago, with Mr. R. N. Lowry, who will continue to represent the Plymouth Locomotive in this territory, but will devote his time exclusively to the construction and contracting field, while Mr. Nelson will be concerned with the pit and quarry field.

Owing to the rapid strides which the Plymouth Locomotive builders have made in adding a number of heavy models, it has been deemed necessary to increase the sales organization to take care of the broadening market.

## Milwaukee Locomotive Catalog

The Milwaukee Locomotive Manufacturing Company has recently issued a new catalog, number 145, describing its complete line of gasoline locomotives built in sizes from 4½ to 18 tons. The catalog is generously illustrated and gives the prospective purchaser ample data from which he can judge the adaptability of the unit to his operation.

The manufacturers point out that their product represents more than eighteen years constant effort and experience in the development and perfection of gasoline motive power for track haulage. Their new type "H," the company claims, sets a new standard in both design and construction, providing greater flexibility in power and speed and the utmost haulage economy. Many noteworthy improvements are incorporated in the new design. The manufacturer believes that the new product will be especially economical and practical around stone quarries, sand and gravel pits, cement works, road building operations and mines.

The larger models are adapted for switching and spotting of freight cars and are now being extensively used for that purpose. The specifications embody the same high quality which has marked these locomotives in the past.

All type "H" locomotives are built on the same design and the eight sizes extend over various gauges of track from 18 to 56½ inches. All have inside wheels, which the manufacturer claims has a distinct advantage over outside wheel construction. The frame which is the foundation of the power unit is of exceptionally rigid and sturdy construction. All type "H" locomotives up to and including the 12 ton size have semi-steel side frames with reinforced channel iron and sills. The larger sizes have cast steel side frames with reinforced channel iron end sills.

The frame bolts are made of medium carbon steel and machined to close limits. All draw pocket castings are made of cast steel and are so designed as to prevent the locomotive from binding on the cars when rounding sharp curves. The frames are designed with the center of gravity extremely low which lessens the tendency toward pitching and rocking.

# Producing Talc at Waterbury Vermont

**By F. A. Westbrook.**

THE Eastern Magnesia Talc Company has an interesting talc mine and mill at Waterbury, Vermont, which differs considerably from the same company's operation at Rochester, which were described in the December 1st, 1925, Pit and Quarry. At Rochester the company operates a shaft mine, but at Waterbury it has an adit mine. The mill at Waterbury is located at the end of the adit, in fact the ore is brought directly into the top of the mill without coming out from under cover at all.

**The Mine**

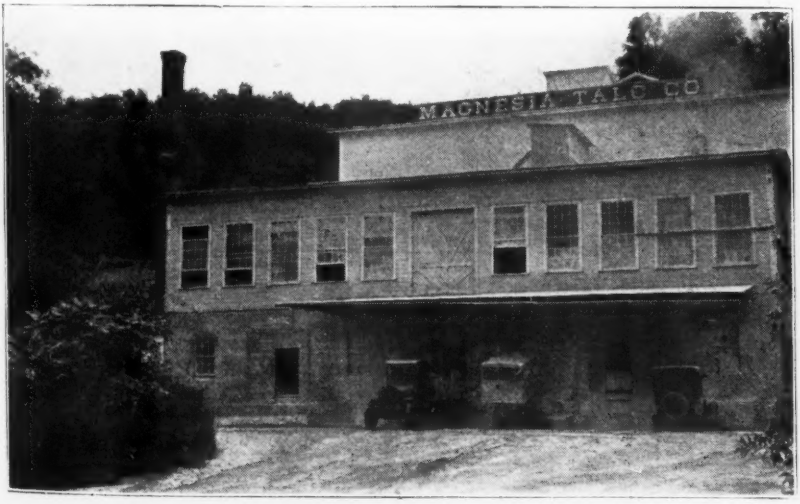
The adit has been run at a slight upward angle into a vein of talc between two block walls. It is now about 2,700 feet long. There are stopes about every 100 feet. These are 8x10 feet in size, or larger depending on considerations of safety. Sometimes they are as much as 200 feet high. The angle of the stopes is about 45 degrees or enough for the loosened talc to slide down to the bottom. In some cases the stopes have branches. In addition to this there are horizontal cross-cuts from the main adit and these also have stopes running off from them.

A new tunnel is being made through one of the black rock walls parallel to the main adit for a distance of about 300 feet. This may be extended somewhat further later on but in any event the end will be connected with the present adit. The reason for making this new tunnel is that the roof of the corresponding portion of the old adit shows signs of sinking and is therefore approaching the danger point. As soon as the new work is completed the old adit will be caved and the talc taken out through cross-cuts through the black rock. The vein talc of this mine is not very safe and most of the adit and the cross-cuts are fully timbered as are the bottoms of the stopes.

Blasting is done with 40 per cent dynamite. The loose material, sometimes broken up by secondary blasting, is allowed to slide to the bottom of the stopes each of which is provided with a door and lever for loading dump cars.

The main adit and cross cuts have tracks for dump cars of about 1.1 tons capacity which are hauled by an Atlas storage battery locomotive equipped with 80 Edison cells. The grade of the adit is slightly upward into the mountain, so that it favors the hauling of loaded cars downward to the mill. The locomotive is capable of pulling about eight empty cars into the mine.

The mine is electrically lighted and the slope to the mill makes it possible for the cars, loaded with the men, to find their way out by coasting, if




Front of Mill Showing Loading

Dump Cars Over Grizzley; Large Pieces Are Broken By Hammers

all lights should fail.

This mine is provided with a ventilating shaft leading to the surface from near the inner end of the main adit. This has been felt necessary on account of its increasing length.

Another peculiarity of this mine is that it does not require pumping because water has no place to accumulate to any extent but runs out of the main adit.

**The Mill**

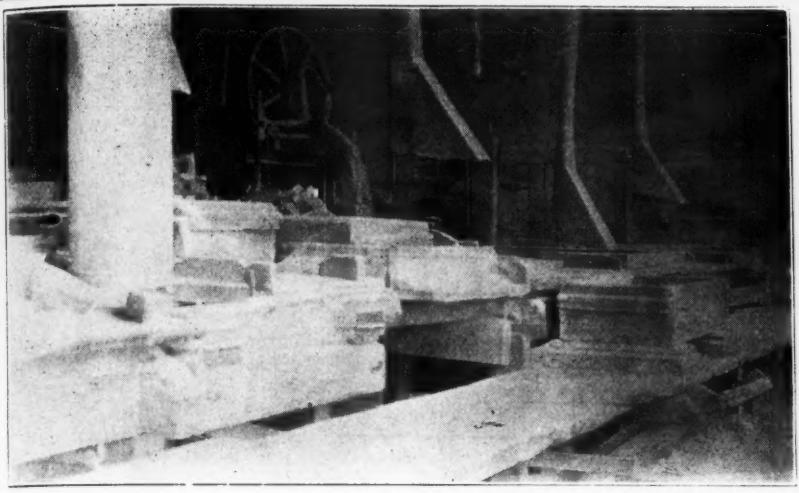
Ore, as already explained. is brought in cars directly to the top of the mill from the adit. These cars, one at a time are run over the storage bins. There is a sort of heavy wooden grizzly at this point and any pieces which are too large to pass through it are broken up by sledge hammers.

The manner in which the bulk of the material is handled is shown on the accompanying flow sheet, which indicates the type and make of all the machines. It will be noted that the same general plan of reducing the handling, or labor cost to minimum, by a highly developed system of conveyors and elevators has been followed as at the Rochester mill.

**Making Crayons**

The products of this mill include crayons which are used for marking metals, such as iron, steel, brass, etc. The vein talc obtained from this mine is extremely well suited for this pur-

Dumping Ore from Car Over Grizzley



Crayon Making Dept. Showing Band Saws and Circular Saws at Benches

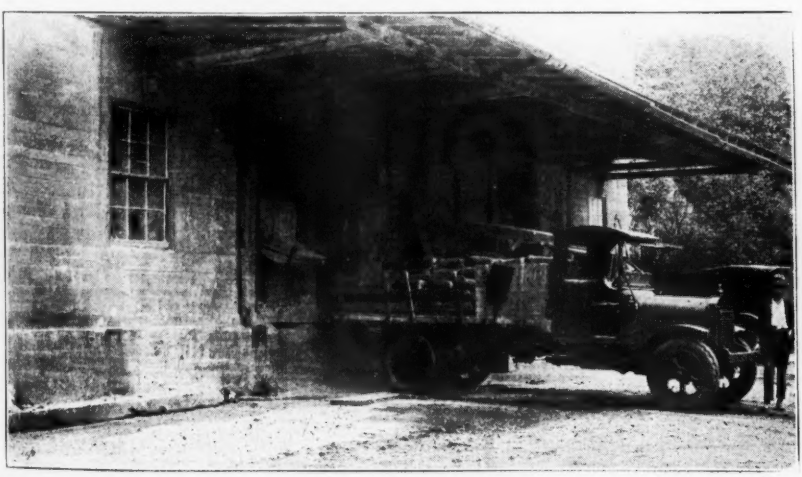
pose. Quarry blocks of suitable shape are taken to the crayon department, located adjacent to the point where the mine cars are dumped over the storage bins. The selected pieces of talc are passed into a box, or bin, through a chute from which they are taken as wanted.

The first operation in making the crayons is to square up the blocks by means of an ordinary band, or jig saw; they are next cut to size by 12-inch circular saws. Three sizes are made—5x1¼x¼ inches 5x$\frac{5}{32}$x$\frac{5}{32}$ inches and round 5x¼ inch crayons. The second of these sizes is used for turning the round crayons. The illustrations show the band saw and part of the benches equipped with circular saws and exhaust hoods for carrying off dust.

**Shipping Department**

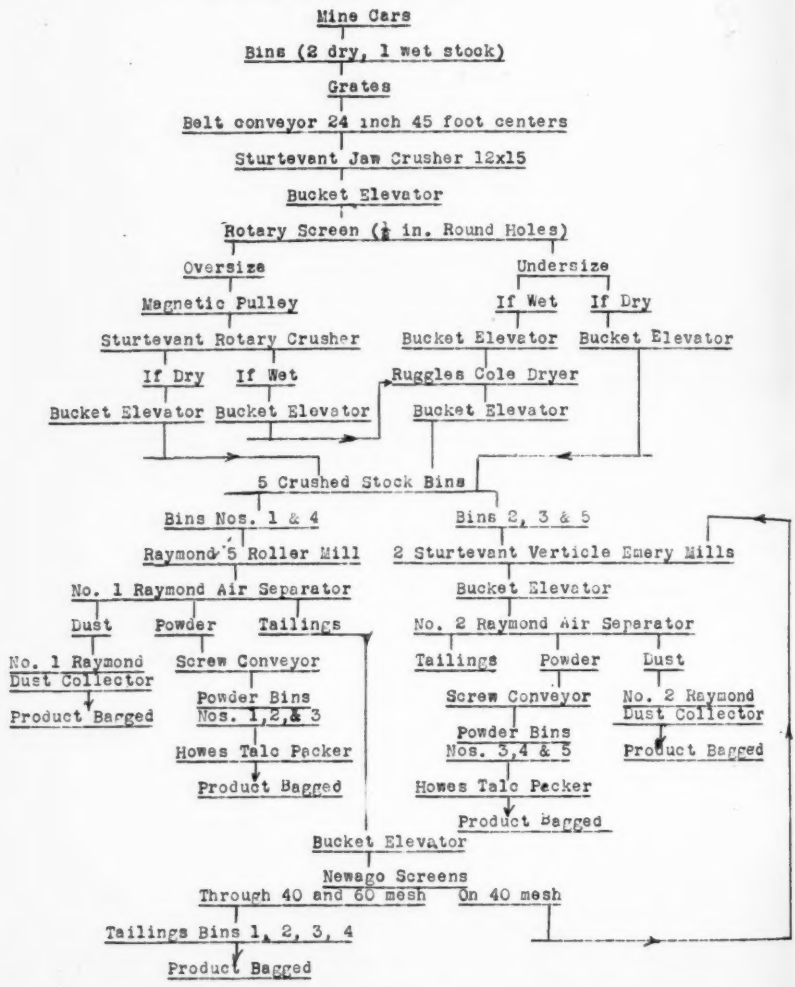
The shipping department is located adjacent to the bagging machines so that the bags may be placed on four wheeled hand trucks and taken directly to the trucks. The crayons, which are packed in boxes, come down to this point in a chute.

The material is placed in both burlap and paper bags and the choice of container is largely decided by the desires of the consignee. The rubber companies which are large users of



Truck at Loading Platform

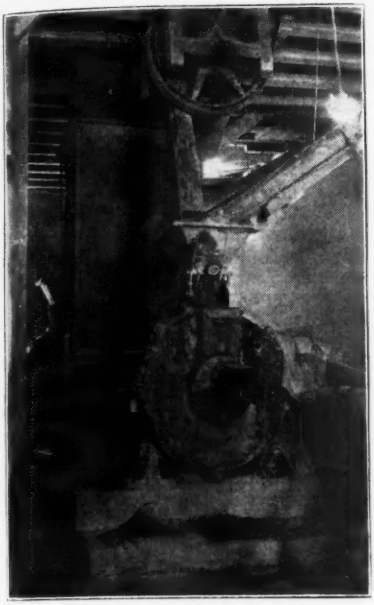
Flow Sheet
Eastern Magnesia Talc Company
Mill At Waterbury Vermont.




fine talc specify bags. The paper manufacturers specify both ways. The comparatively coarse rejections from the air separators which are used for roofing are always placed in burlap bags. Evidently there is an opportunity here for some appropriate organization to do some standardizing, as such apparently unstudied and variable methods of packing are bound to lead to confusion and dissatisfaction to all concerned.

The bags, whether of burlap or paper, are taken to the company's own siding about 1.5 miles away by two Mack trucks. Unfortunately the mine and mill are situated on the opposite side of the river from the Central Vermont Railroad so that a siding directly to the plant would mean an expensive bridge. It is consequently necessary to have the siding as close as possible to the nearest available highway bridge. This point is also much nearer than the freight station at the town of Waterbury. Shipments average about 72 tons of talc per day in bags and about 30,000 gross of crayons per year.

Power is brought to an outside



Motor Driven Emery Mill and Conveyor to Air Separator

bank of transformers, at 11,000 volts and stepped down to 220 volts for distribution throughout the mill. All equipment is motor driven.

A desirable, and perhaps rather unusual feature, for this kind of operation is the fact that the company has provided seven four-room cottages for its employees, and has also purchased a nearby farm house. These are kept in very good condition, in fact they are far superior to what one is accustomed to see in the vicinity of coal mines, for instance. As the village of Waterbury is about three miles distant from the mill with no very convenient means of transit these living quarters fill a distinct need.

### Westinghouse to Build in Detroit

The Westinghouse Electric and Manufacturing Company has purchased property in Detroit for the construction of a new building to house its district office, warehouses, and service stations. This is in accordance with the policy of the company to bring these units together in each district.

It is expected the new building will get under way in the first half of 1926. A floor space of 100,000 square feet will be necessary to take care of present requirements of the Detroit branch.

The practice of maintaining all the operating units of each branch in a central building now is in operation in several of the larger cities of the country, and has shown many advantages in rendering service and facilitating the handling of business. A smaller project also is under way at Miami, Florida.

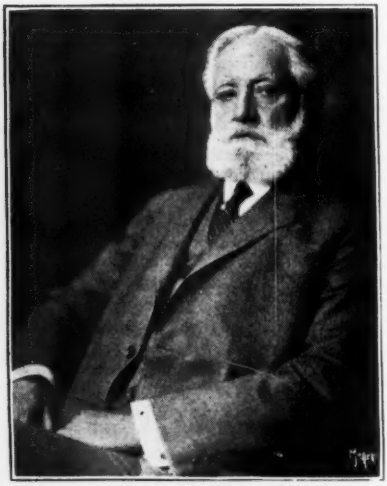
Cities where single buildings now house the three units include—Philadelphia, Chicago, Kansas City, Cincinnati, Indianapolis, Huntington, Los Angeles, Minneapolis, Seattle and Atlanta.

Waste Disposal Tracks from Top of Mill

## Cement Pioneer Dies

William Dickinson, vice president of the Marquette Cement Manufacturing Company died at his winter home at Redlands, California, January 27. He had been ill for two months. His body was brought to Chicago for burial.

Mr. Dickinson was born in Hadley, Massachusetts, November 3, 1848 and came to Chicago when he was twelve years old. He was educated in the Chicago public schools, graduating from the old West Division High School.



William Dickinson

Mr. Dickinson started his business career in Chicago, in 1873, associated with Philip Wadsworth who operated the Empire Warehouse Company. This company purchased 250 barrels of cement from an importer and tried to introduce it in the middle west but met with a good deal of prejudice. At last they sold the new material to John V. Farwell, wholesale dry goods merchants for a structure they were about to erect. This was the first portland cement used in the middle west.

Later with his brother John and Jerome A. King, Mr. Dickinson formed the firm of Dickinson Bros. & King which was active for many years in the warehousing and selling of cement. This venture undoubtedly led to his entry into the cement manufacturing business.

The Marquette Cement Company, now known as the Marquette Cement Manufacturing Company, with which Mr. Dickinson's name has been so long associated was organized in 1898. A year later the concern began operating with a capacity of 250 barrels a day. Mr. Dickinson was an active member of the Portland Cement Association and a regular attendant of its meetings. As one of the pioneers of the industry he was widely known all over the country. He is survived by a widow, and two children, Woodbridge Dickinson and Mrs. Max Hoffman.

## New Hercules Engines

Simplicity and ruggedness are claimed by the manufacturers as the outstanding features of the new Hercules engines and power units. These features are the result of painstaking engineering and the elimination of everything not absolutely essential in the large 100. h.p. "TXA" and in the 20 h.p. type "O".

The combined, unified crank case and cylinder block provide a rigid support for the crankshaft preventing whipping and vibration. The water jacket extends the full length of the cylinder barrels. This promotes even expansion of the block and permits closer valve clearances.

The oil pan is of pressed steel and has but one horizontal and one vertical gasket. No oil lines are attached to the pan. All connecting rod and main bearings, the oil pump and the oil lines are readily accessible. The pan has no troughs, forced feed lubrication being used. All is strained through a cleaner before reaching the pump.

The design of the water pump support makes misalignment of the unit impossible. The gear with its shaft, bushing, sleeve, etc., can be removed through the rear without taking off the front cover or radiator. The oil pump is of the gear type with an easily adjusted regulating valve. It is driven through spiral gears at the rear end of the cam shaft.

The crank shaft is supported by three main bearings of more than adequate size and is put into both dynamic and static balance by the most improved method.

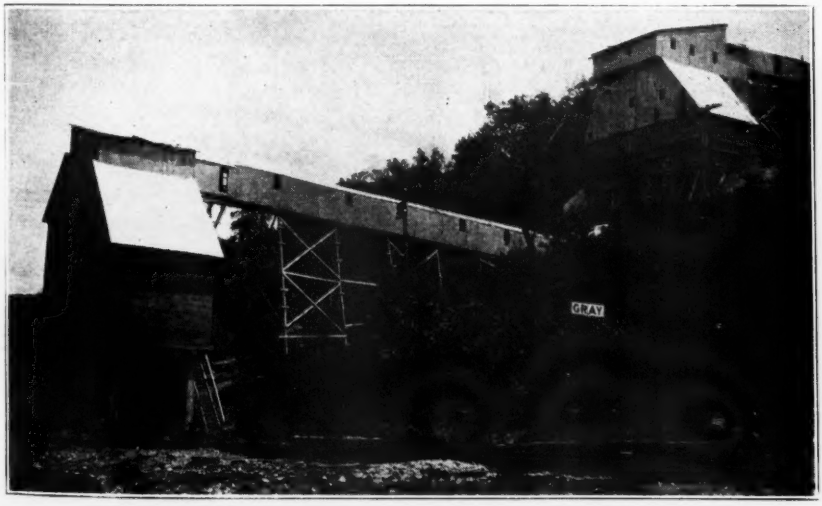
The main bearing caps as well as the connecting rods are drop forged of high carbon steel. These are accurately machined, tinned to insure bond between the steel and the white metal and babbited.

# A Market Problem Profitably Solved By This Crushed Stone Company

**By H. W. Munday**

LOST CITY in Tulsa County, Oklahoma, has a flat topped hill about 1,000 acres in extent which is interesting to the crushed stone industry because two companies are carrying on successful and in many respects unusual crushed stone operations on this hill. This deposit is overlaid with a solid ledge of limestone about 50 feet thick which shows an average analysis of 88 per cent calcium carbonate. The lower strata consists of approximately 110 feet of shale, another layer of 30 feet of sandstone, above this is another layer of 34 feet of shale on top of which is about 50 feet of limestone. There is a very thin seam of coal between the limestone and the shale which must be separated from the clean stone. The supply of stone is practically inexhaustible and it passes all requirements for concrete highway work under Federal aid. It cements excellently and makes a strong and lasting road base. The Zenith Limestone Company and the Standard Paving Company are both operating plants here. The operations of the Standard Paving Company are the subject of this article as the operation of the Zenith Limestone Company were discussed in detail in the April 15th, 1925, number of Pit and Quarry.

However it will be interesting to state something here of the Zenith Limestone Company's operations as both plants are of the side-hill type. This company utilizes gravity throughout the plant with the exception of one belt conveyor which delivers the stone horizontally through an enclosed callery 200 feet to the screens. The plant is operated throughout by electricity with the exception of the steam shovel and locomotive. Armstrong well drills do the drilling and the stone is loaded by a Marion steam shovel into quarry cars which are hauled by a standard Baldwin steam locomotive to the plant. These cars are unloaded by a plow which is suspended on cables so that the bottom of the plow is on a level with the floor of the quarry car. As the car moves forward the plow scrapes the material off into the initial crusher. These cars were designed by Mr. Long, a partner in the company, and each have a capacity of 50 tons. The plant is equipped throughout with Kennedy gearless crushers and Kennedy screens. The tracks under the storage bins make




The Unloading Bins of the Plant Are Directly Over the Tracks

A View in the Quarry

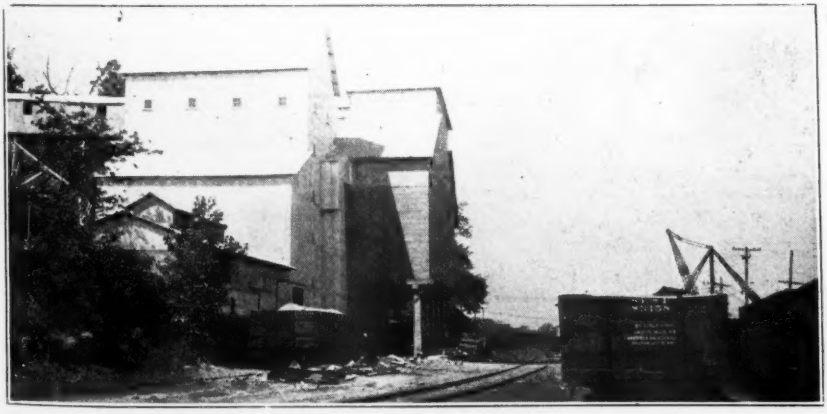
it easy to load four cars at one time. The storage capacity is about 3,500 tons and there are 800 feet of storage track for empty cars and the same amount for loaded cars. The storage bins are made of 3-inch boards. Between each board there is a 3-inch air space. This type of bin retains the material and saves considerable in lumber. The bottoms of the bins are constructed of 3-inch boards on end. Material is discharged from the bins through clamshell bin gates. The fine material is stored in bin sections directly below the screen house. The coarser sizes of stone are exposed to rain as there is no roofing over the storage bins. This is interesting but

Belt Conveyor to the Loading Bins

practical as there is no need for keeping the coarser sizes of stone absolutely dry. At the discharge end of the belt conveyor there is a stone box or hopper from which material is fed to the screens. This hopper has sloping sides to which iron bars are fastened at right angles. These bars are so arranged as to permit a quantity of stone to lodge between them and thus form a protective surface for the sides of the hopper. This method reduces the wear to a considerable extent. Another interesting innovation has been adopted with the chute that delivers to the belt conveyor at the receiving end of the conveyor. This chute discharges in the same direction as the belt runs, and a number of holes have been punched toward the end of this chute. The fine material drops through these holes onto the belt and acts as a blanket for the heavier material which is discharged from the end of the chute. This arrangement undoubtedly reduces the surface wear on the belt. The chutes referred to are made of 10-inch pipe. As any particular section becomes worn, the pipe can be turned and a new surface exposed to the shock of falling stone. These closed chutes have proved to be very practical in the operation of this plant. At present the plant is producing 2,000 tons of stone per day in sizes of 2, 2½, 1, ½ and 1¼ inches and dust. The plant is so arranged, however, that this production can easily be doubled if necessary. Stairways at the plant are all on the outside and were constructed to take advantage of the space between the boards that made up the side walls. The boards for the stairs were cut a little longer than needed and were then fitted into the open spaces and nailed. The company is installing every known safety device for the protection of its employees.

The Standard Paving Company's plant has a capacity of 600 tons of crushed rock per eight-hour day, and the asphalt filler plant has a capacity of five tons per hour. The limestone ledge is overlaid with a layer of earth from six inches to six feet in depth. This stripping is done during the winter with Erie type B steam shovels and Ford trucks. The drilling operations are carried on with a Keystone electric drill rig, after which the rock is shot down in a single face wall. Du Pont 40 per cent powder is used in blasting. For auxiliary drilling Ingersoll Rand jack hammer drills are used. An Ingersoll Rand 600 cubic foot compressor furnishing unlimited air for this operation. By using a large compressor the quarry is never shut down due to any small inefficiencies of the compressor, such as leaky valves, etc. After being finally blasted to about one cubic foot, the rock is hand-picked so as to avoid any possibility of dirt in the final loading. After hand-picking, the stone is loaded into one-yard, V-shaped, Koppel side-dump cars and run by gravity to a chute which feeds the primary crusher. These cars are brought back to the men by a 3½ ton Burton gasoline locomotive. The face of the quarry is about 500 feet from the first crusher. Forty dump cars are operated.

The first crushing is made in the number 7½ Austin gyratory crusher.



The Storage Bin and Track Facilities

This Shows the Condition of the Stone

The stone is then elevated to an Austin screen above the storage bins. The rock which is of suitable size is there stored for transmission to the loading bins. The rock which has not been crushed small enough is sent to a number 5 Allis-Chalmers gyratory crusher which completes this operation. From this last crusher the rock is elevated to a second screen which sizes the rock. A main belt conveyor is provided for transmission of the rock separately, according to size, to a Hummer vibratory screen of the magnetic type where all dust and other foreign material is removed, leaving only clean, suitable rock, such as is required under the strictest Federal aid inspection. All elevators and belt conveyors are of Link Belt manufacture.

The first years of operation of this quarry soon showed that quite a bit of limestone dust and fine rocks would be produced which were not suitable for concrete work. It soon became necessary to produce a material from this dust which would be suitable for market. The result was the installation of a Kennedy-Van Saum ball mill which produced an asphalt filler of suitable fineness. The material is also of great value as agricultural limestone on Oklahoma soils which are largely underlaid with sand stone. The dust is elevated to a BB hopper from which it is fed into a dryer of special design and of suitable capacity. This dryer removes all moisture, which has been collected by the limestone, by heating to a temperature of 350 degrees Fahrenheit. The heated dust is then elevated to a steel tank from which it is fed over an automatic table into a ball mill driven by a silent chain from a slip ring electric motor. After the limestone has been crushed to suitable fineness, it is

Note the Foliage Surrounding the Plant

picked up by a fan and elevated to a Kennedy cyclone dust collector where the coarse material is rejected to come back to the mill and the fine material drops into a storage bin. This process is repeated until all material will pass a fineness test of 93 per cent through 200 mesh and 98 per cent through 100 mesh. Under this storage bin is located a one-sack Bates bagging machine from which the product goes to immediate shipment or storage. This last operation is governed by the working of the quarry, as there is a certain amount of dust produced with each ton of stone crushed. An average production of five tons per hour can be easily maintained.

This plant is located close to the city of Tulsa which makes possible the use of commercial electric power; so all operations are carried on by electricity. A small machine and blacksmith shop is maintained at the quarry for quick repairs. However, the main shops of this company are located at Tulsa, only six miles away, so that any repairs may be accomplished in minimum time.

The loading facilities are exceptionally good. The loading bins for rock are located directly over a switch from the St. Louis and San Francisco Railroad and are high enough so that gondola cars can be loaded from them by gravity. The asphalt filler plant is located on the same switch and box cars are run right to the door for loading. This arrangement insures quick service due to the plant being located only three miles from the West Tulsa yards of one of the largest railroads in Oklahoma.

The rock is either used on the company's own projects in city and highway work or as the capacity of the plant is large enough there is available about 300 tons a day of crushed able daily about 300 tons of crushed rock and 20 tons of asphalt filler.

This quarry is organized as a separate department and is a complete unit in itself under the supervision of the president of the company Mr. I. V. Gray. Mr. J. A. Bartlett is superintendent and sales manager. Mr. Jeff Huddleston has charge of operations at the quarry.

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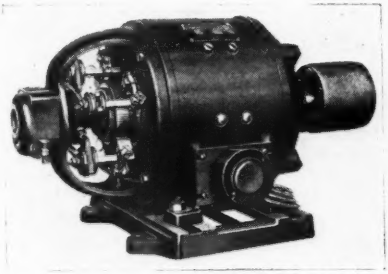
Mr. Robert J. Beler has recently poined the Pittsburgh sales office of Foote Bros. Gear and Machine Company, as assistant to Mr. W. G. Kerr, district representative.

## Louis Allis D. C. Motors

The Louis Allis Company has developed a new direct current motor, known as their type N. A. This is a 40 per cent rating general purpose motor with heavy overload capacity. The new series is interchangeable, rating for rating, in all essential dimensions with the Louis Allis polyphase motors.

Improved design and ventilation insures uniform cooling throughout the windings and makes an unusually cool motor under operation. The bearing chamber is designed to hold an extra quantity of oil, making frequent renewals of oil supply unnecessary. The bearing inspection opening is closed by a removable cover. This metal cover, while permitting easy inspection, gives in effect a dust tight bearing chamber.



The New Direct Current Motor

Entire elimination of oil trouble is claimed by virtue of a new design incorporated in the bearing. Trouble experienced in the past, due to oil soaked windings, from oil throwing, creepage, and so forth, is now made impossible by the present design.

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### Southwest Road Show

The First Annual Southwest Road Show and School will be held at Wichita, Kansas, March 2, 3, 4, and 5 under the auspices of the Thresher and Tractor club of that city. Word has been received by F. G. Wieland, the general manager that the entire southwest will participate in the exhibition. The federal government has promised to send the largest and most complete exhibit it has desplayed anywhere and the American Road Builders will have its exhibit at the school. The school is primarily for the 50,000 state, county and township officials in the territory and the 20,000 contractors and dealers.

# Slate in 1925

The value of the slate sold at the quarries in 1925 was $12,785,000, according to the estimates furnished by producers to the Bureau of Mines, Department of Commerce. This was 9 per cent more than the value reported for 1924. Slate reported sold for roofing, blackboards, and granules and flour showed increase in both quantity and value, while the other products decreased.

The roofing slate sold amounted to 477,000 squares, valued at $4,900,000, an increase of 2 per cent in quantity and 6 per cent in value. There was an increase of 41 cents in the average per square.

The total sales of mill stock amounted to 10,405,000 square feet, valued at $4,110,000, an increase of 4 per cent in quantity and 5 per cent in value. Sales of mill stock for blackboards was the only variety of mill product that showed increased sales—23 per cent in quantity and 39 per cent in value. The estimated output was 5,000,000 square feet, valued at $1,596,000.

Sales of structural slate—2,276,000 square feet, valued at $880,000—decreased 3 per cent in quantity. Sales of electrical slate, estimated at 1,654,000 square feet, valued at $1,355,000, decreased 8 per cent in quantity.

In 1925 as in 1924 strikes in some of the quarries in the Pennsylvania district had the effect of curtailing the output of roofing slate and all classes of mill stock. There were also strikes in the quarries of the New York-Vermont district. The general demand for roofing slate was as good or better than in 1924 during the first part of the year, and prices were reported higher in 1925. The demand for structural and electrical slate increased toward the latter part of the year. The demand for blackboard material was exceptionally good until about October when it slowed down considerably.

The sales of crushed slate for roofing granules and flour in 1925 was estimated at 540,000 short tons, valued at $3,685,000, an increase of 5 per cent in quantity. The average value per ton was somewhat higher than in 1924.

The accompanying table compares the estimated sales of slate by quarrymen in 1925, by uses, with the sales in 1924.

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The Mundy Sales Corporation, distributors for the J. S. Mundy Hoisting Engine Co., has appointed the Carbine-Harang Machinery and Supply Company of New Orleans as its representative in southern Louisiana.

**Roofing Slate, Mill Stock,[a] and Slate Granules Sold in the United States in 1924 and 1925, by Uses**

| Use | 1924 | | 1925 (estimated) | |
|---|---|---|---|---|
| | Quantity | Value[b] | Quantity | Value[b] |
| Roofing ..... squares | 469,393 | $4,626,614 | 477,000 | $4,900,000 |
| Approximate short tons..... | 158,420 | ..... | 161,000 | ..... |
| Electrical ..... sq. feet | 1,801,450 | 1,518,092 | 1,654,000 | 1,355,000 |
| Approximate short tons..... | 12,900 | ..... | 12,000 | ..... |
| Structural and sanitary.....sq. feet | 2,346,050 | 951,964 | 2,276,000 | 880,000 |
| Approximate short tons..... | 16,640 | ..... | 16,000 | ..... |
| Grave vaults and covers....sq. feet | 566,160 | 142,167 | 552,000 | 142,000 |
| Approximate short tons..... | 8,100 | ..... | 8,000 | ..... |
| Blackboards and bulletin boards... ..... sq. feet | 4,069,670 | 1,151,767 | 5,000,000 | 1,596,000 |
| Approximate short tons..... | 10,930 | ..... | 14,000 | ..... |
| Billiard-table tops.....sq. feet | 341,200 | 131,028 | 286,000 | 117,000 |
| Approximate short tons..... | 2,400 | ..... | 2,000 | ..... |
| School slates .....pieces | 1,710,240 | 27,348 | 1,220,000 | 20,000 |
| Approximate square feet..... | 884,650 | ..... | 637,000 | ..... |
| Approximate short tons..... | 1,200 | ..... | 850 | ..... |
| Granules .....short tons | 512,810 | 3,178,454 | 540,000 | 3,685,000 |
| Other .....short tons (estimated) | 4,300 | 48,582 | 8,150 | 90,000 |
| Total (quantities approximate, in short tons) ..... | 727,700 | $11,776,016 | 762,000 | $12,785,000 |

[a] In 1924 the mill stock sold, including school slates, was 10,009,180 square feet, valued at $3,922,366; in 1925, 10,405,000 square feet, valued at $4,110,000.
[b] F. O. B. at point of shipment.

# Loading Sand and Gravel By Derrick

THREE years ago Antonio Beatrice purchased thirteen acres of ground at Newton Lower Falls, Massachusetts. A 1,000 foot frontage on a paved highway was a feature of this property. The location was only seven miles from Boston. A good grade of sand and gravel with but little overburden existed on the property. A company known as A. Beatrice and Son was organized and a modest capital provided for the erection of a sand and gravel plant. The first purchase included an Erie type B steam shovel with a 1½ yard bucket and a Conant portable loader. Good business resulted from the start, and today an economical operation is carried on with an average daily production of more than 250 yards and a plant capable of producing 500 yards.

The deposit is being worked in the shape of a horse shoe. The floor of the pit is about 10 feet below the level of the abutting highway. All material is delivered by truck, and the plant has been built and the deposit is being worked so that trucks can get in and out with ease.

The bank averages 75 feet in height. A Clyde steel derrick equipped with a clamshell bucket loads the material direct to a 5 yard field hopper. This derrick is equipped with a Clyde steam hoist and a separate Clyde swinging engine to operate it. The illustrations accompanying this article give an excellent picture of the operation of this unit.

The material is fed from the field hopper by a New England feeder to a New England scalping screen 6 feet long and 40 inches in diameter with 2¼ inch perforations. The oversize material passes to a 14x28 inch New England crusher. All material passing the scalping screen is handled by a New England bucket elevator with a capacity of 2 tons per minute to a New England screen 20 feet long and 48 inches in diameter. The tailings from this screen pass to a small New England crusher. The material is discharged directly to four bins of 600 tons capacity. Sand, ½, 1 and 2 inch gravel are produced and stored separately. These bins were designed and built by the New England Road Machinery Company.

Trucks are loaded from directly

Notice the Approach to the Plant

The Derrick Loading Sand and Gravel

under the storage bins. Six trucks handle the delivery of all material. Four of these trucks are Packards and two are Macks. The Mack trucks are equipped with Heil dump bodies. The market radius is less than 20 miles and can be served quickly and economically. Material can also be stored outside when necessary and the trucks loaded by the Conant loader. An interesting point is that material is sold by the yardage method. This is not an accurate method, and truck scales will be installed soon. If a belt conveyor were installed with a movable field hopper, the layout would be more flexible and an installation of such a belt conveyor is being planned.

The plant is operated by a force of 14 men. Six of these are truck drivers; four others serve as common laborers around the pit and plant. There is one man on the shovel, one fireman, one man to operate the derrick and one to watch the screening and crushing plant. Antonio Beatrice is president of the company and his son, Carl Beatrice, manages plant operations.

## New Incorporations

Portland Cement Products Corporation, Dover, Delaware. Capital $3,500,000. To deal in products of the earth. Harry C. Hand, Michael A. Castaldi, Raymond J. Gorman, New York City, incorporators.

Grays Harbor Cement Products Company, Aberdeen, Washington. Increasing capital stock from $20,000 to $26,000.

The Cincinnati Concrete Co., Wilmington, Delaware. Manufacturing of building materials from cinders, cement, clay, etc. Capital $2,100,000.

The Kent Sand & Gravel Co., Cleveland, Ohio. Capital $500. Edward T. Butler, Jr., M. M. Feidner, J. G. Fogg, A. O. Dickey, H. E. Habelman, incorporators.

The Plant of A. Beatrice & Son

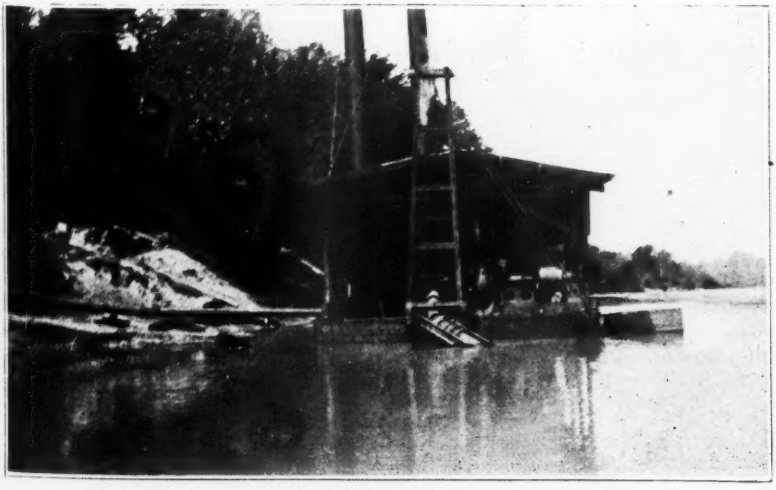
# Hydraulic Dredge Efficiency Features This New Sand and Gravel Plant

SEPTEMBER FIRST of last year saw the christening of the new hydraulic dredge plant of the Pearl River Gravel Company. This plant is located upon a deposit of river gravel lying along the Pearl River, on the New Orleans Great Northern railroad thirty-four miles south of Jackson, Mississippi. The character of the material as shown by samples and tests from prospect holes made previous to construction, showed hard durable sand and gravel of an unusually well graded size, from fine to coarse particles. On the basis of separation as between gravel and sand, by one-quarter inch mesh, the test samples showed an average ratio of two parts gravel to one part sand. This ratio has run almost uniformly, one car of sand for each two cars of gravel, in operations to date.

The plant consists of a floating hydraulic dredge, and a stationary gravity screen and tipple situated on two parallel loading tracks so that both materials are loaded simultaneously. The hydraulic dredge consists of a wooden barge fifty feet in length with a twenty-five foot beam, and has a depth of fifty-four inches and draws twenty-seven inches of water in working condition. The hydraulic unit is a ten inch Amsco manganese steel heavy duty pump, with ten inch suction and discharge. This unit runs at 600 r.p.m. maximum.

The pump is driven by belt connection from a sixteen by sixteen center crank automatic McEwen oil engine running at 215 r.p.m. Various experts advised that an automatically governed engine was not suitable for this character of service, for the reason that it was believed that this type would stall under loads occasioned by heavy surges of solids. However, the Pearl River Gravel Company find that the governor of this engine is of such design that it is possible to so adjust the tension on the governor spring that the engine actually picks up speed under momentary over-loads and then falls into her regular stride. Nor is there any difficulty from the stalling of the engine. In fact, its performance is entirely satisfactory.

Steam is furnished by two horizontal internally fired Casey-Hedges dredge boat boilers rated at 70 h.p. each. Feed water is taken from a Cochrane open feed water heater of the thoroughfare type utilizing the exhaust from the engine through a short connection. Feed water temperatures are maintained by this means, at 210 degrees. The heater is located at sufficient height above the hot water pumps to avoid re-evaporation in the suction connections. Ken-



The New Dredge Unit of the Pearl River Gravel Company

A Load Ready

tucky nut coal is used for fuel.

The ten inch suction line, which is forty-five feet in length measured from the center of hose connection, to pump is raised, lowered and slewed by means of a 6¼ by 8 Clyde double cylinder, three drum dredging engine consisting of one rear drum for hoisting and two forward pony drums for slewing.

This covers all the mechanical equipment on the dredge boat with the exception, of course, of two boilers-feed-pumps, one for cold water and one for hot water, which are so connected that either, or both may feed either hot or cold water to the boilers, or may be used jointly as fire pumps or for removing water from the hull. Penberthy ejecters are used both for priming the gravel pump and for removing normal leakage from the hull.

The hull is built entirely of southern long leaf pine timbers with three parallel bulkheads fore and aft, and is divided transversely with 6 by 12 beam timbers on four foot centres for supporting the deck and bottom. All timbers below the water line were painted with Baltimore copper marine paint, and all seams calked with cotton and oakum.

The screen and loading tipple consists of a simple timber frame work with a ⅛ by 1 woven wire screen, nine feet in width by twelve feet long. This is carried on angle-iron supports on 2½ foot centers and set upon an angle of thirty-one degrees to the horizontal. Sand and water which passes this screen may go either directly to a settling tank, situated over the center of the sand track, or it may be rescreened to remove the pea-gravel by passing through a number 4 screen cloth. This number 4 screen is secured to a frame which may be readily removed and any other size mesh substituted. An eight inch automatic counter-balanced valve loads the sand directly into car beneath the settling hopper. Oversize, either one inch or two inches, may be taken away by a removable screen hinged at the bottom of the main screen. Arrangements are being made so that material rejected by any of the screens may be passed into a flume and returned to the pump-sump, from which it may be reclaimed at any time.

The pump discharge is delivered to the top of the tipple approximately thirty feet above top of rail, or about forty-five feet above water level. Goodyear rubber sleeves are used in the suction and discharge lines throughout. The main drive, from engine to pump consists of an eighteen inch, seven ply Goodyear rubber belt with

The Track to the Loading Bin

Filling a Car with Material

number 55 Alligator lacing. The drive pully is seventy-two inches in diameter by twenty inches face, and the driven pulley twenty-six inches in diameter by twenty-four inch face, and are on approximately twenty feet centers. It has been found necessary to use a saw mill type hinged idler pulley on the top of the belt near the driven pulley to obtain a greater arc of contact.

With the layout described, it is possible to load four forty-ton cars of material per hour. The plant was placed in operation on September 1st, 1925, and the best day's performance consisted in loading nineteen cars in six hours, including delays in spotting and moving cars by hand. The loading tracks were built on a grade of about one per cent through the tipple with the expectation that it would be possible to load and spot cars by gravity. However, it was found necessary to install a car puller consisting of a two cylinder single drum reversible Emerson-Brantingham steam hoist connected to a twenty-five horsepower portable boiler. It is not necessary to use this apparatus except when the output exceeds twelve to fifteen cars per day.

The operations of the Pearl River Gravel Company are under the management of R. N. Kinnaird. The other officers include C. B. Johnson, vice-president; J. C. Liggett, secretary, and B. H. Cawthon, assistant manager.

## New Westinghouse Booklet

A comprehensive booklet entitled "The Engineering Achievements of the Westinghouse Electric and Manufacturing Company," has just been published by that concern. It is the work of H. W. Cole, assistant director of engineering of the company and is a credit to his professional and literary ability.

Unlike many booklets of this kind Mr. Cope's work is thoroughly indexed and is so arranged that it is easy to find any subject treated. It is profusely illustrated and the pictures are so well chosen that they are themselves an index to the text.

A generous chapter is devoted to the generation and distribution of power. It announces that work is well under way on the largest generating unit ever built and describes other important installations. Steam turbines, condensers, stokers, transportation and industries are also treated in chapters.

A Train Load

# Ohio Single Line Gasoline Shovel

The Ohio Single Line gasoline shovel has just been placed on the market after rigid tests and the new product of the Ohio Power Shovel Company is said to be meeting with an enthusiastic reception. The manufacturers claim for their new machine, faster operation, lower upkeep costs, higher lift and greater range of action. It has a 1 yard dipper capacity and is convertible by changing the boom to a crane for a 1 yard clam shell or a drag line excavator with a bucket of the same capacity.

The new features claimed for the shovel include, single line hoist. Timken roller bearings instead of bronze or babbit, positive crowding mechanism, one piece cast iron boom, greater accessibility, one piece revolving base casting minimum number of parts, one piece truck casting and a large and powerful engine.

Through the use of the single line hoist which is made possible by multiplying the power in the mechanism instead of by the cable and numerous sheaves, higher lift, increased digging angle, slow traveling cable and compact arrangement are brought about.

It is claimed the single line permits hoisting the dipper 16⅔ per cent higher and the digging angle is increased by the same percentage. The cable running only a third as fast as that of a three part hoist and over only one large sheave and drum gets only a minimum of wear.

The shovel is equipped with either a gasoline engine or an electric motor as desired. The engine is exceptionally sturdy and powerful having a torque of 400 foot pounds and developing 80 h.p. An electric starting and lighting system is supplied when wanted. The engine is directly connected to the reduction gears through a powerful double disc clutch which can be entirely removed without disturbing either the engine or the gear case. An electric motor can be connected in the same manner. The reduction gears are wholly enclosed and run in oil.

The caterpillar truck employs large wheels for continuous treads. This simplifies construction and places the wheels high out of the mud.

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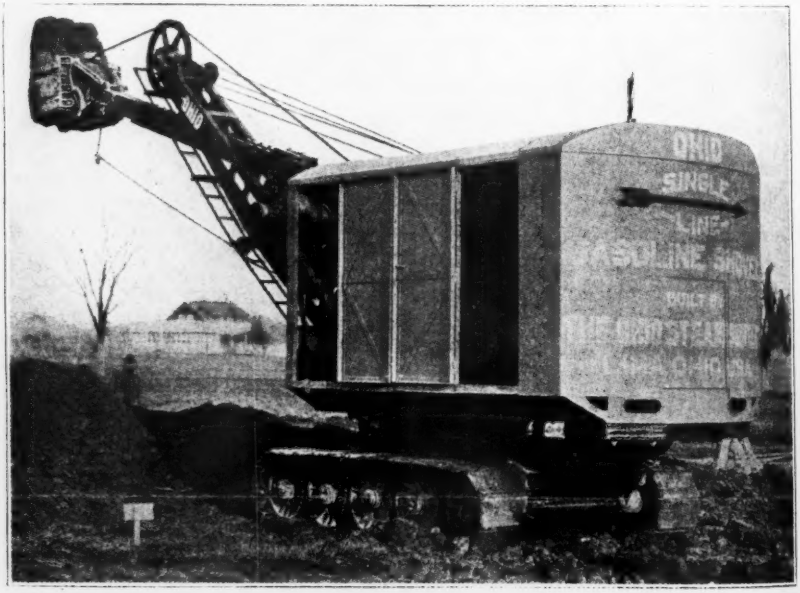
Star Sand & Gravel Corporation, Rochester, N. Y. Capital $25,000. To excavate, buy and sell sands, concrete and concrete products. John M. Redman, Maude Redman, Chester M. Wallace, directors.




Ohio Single Line Gasoline Shovel.

# Quarrying in a Historic Valley

**By George Ransom**

HISTORIC and picturesque Lake Champlain Valley contains a large amount of limestone especially near its northern end. In many places this has a curious formation which makes it easy to quarry, with the result that the traveller in that part of the country frequently comes across operations of various sizes which in their aggregate are extremely important. Formerly these operations were mostly of the lime burning variety but in late years, since the advent of concrete construction, state road building and the active improvement of highways in general, many rock crushing plants have sprung up in this region. Often the peculiar formation of the deposit adds a great deal to the interest of these operations, even to the casual passerby.

On the outskirts of Plattsburg, N. Y., on a high hill overlooking Lake Champlain, is a deposit of limestone worked by the firm of Gebo and Bushey for the purpose of producing crushed rock. It is interesting for two reasons—the peculiar rock formation and the fact that it is rather an isolated plant operated by steam.

The peculiarities of the formation are shown in the accompanying illustrations. It will be seen that the stratification is in immense sheets with a westward inclination. The floor of the quarry, which covers a large area but never has been worked very deep, is of a smoothness suggestive of concrete and forms an excellent base for the crusher and rock bins. Furthermore the soil covering the rock is so thin that it is practically negligible.

It is plain enough that to get stone cut of such a formation is very easy. The machinery which has been installed is of the simplest kind. There is a Climax jaw crusher, a Good Roads Machinery Company bucket elevator and screen with appropriate bins, and a steam engine, made by the Steam Engine Company of Watertown, N. Y., for motive power. A Farguhar portable boiler supplies the steam for engines and drills. The crusher is located below a dumping platform between the engine house and screen.

Undoubtedly an operation of this kind carried on in a small way can nevertheless be profitable. The installation need not be expensive, the rock is not difficult to quarry and there are markets at hand. In winter when it is difficult to work and the market is practically non-existent the overhead is but a small factor to carry.

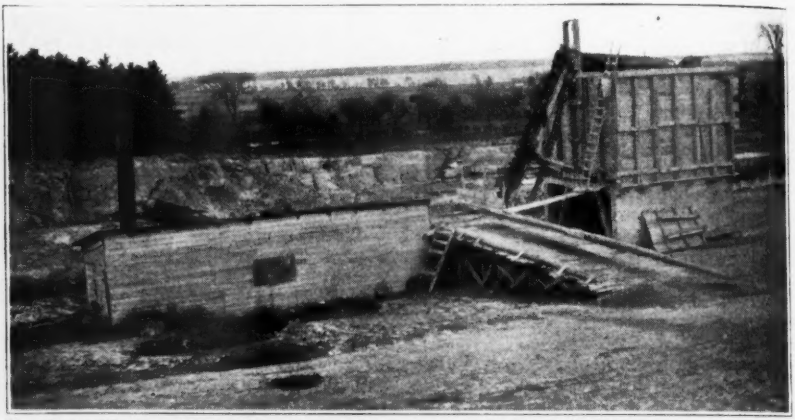
Adolphus Florentine has entered this same field with a small operation in Plattsburg. This plant was discussed in the January 15th number.

The fact that Plattsburg is an important vacation center serving the

View of Quarry Showing Stratification and Drill Holes

northern end of Lake Champlain and the Adirondacks accounts for the excellent roads and the need for keeping these roads improved. Plattsburg is also on the direct automobile route between Montreal and New York. Good roads in this community are important and the demand for crushed stone will increase considerably during the coming year. Building construction in this territory is also normal.

Gebo and Bushey are in a position to expand as rapidly as the demand increases or as is desired. The present operations are returning a unit profit which would only be possible up to a certain production when considerable changes in plant would be necessary.



Crushing Plant with Engine House, Screen on Opposite Side of Dumping Platform

Face of Quarry Showing Stratification and Thin Top Soil

View of Smooth Quarry Floor

# River Sand and Crushed Flint Compared As Fine Aggregate for Concrete

By E. C. L. Wagner
Consulting Engineer, Kansas City, Missouri*

DURING the past year, we have made tests on sands to determine the relative merits of natural river sand as compared to rolled Flint sand. Care was taken to obtain representative samples of sand as actually delivered on the ground ready for use on Federal Aid road jobs. The tests were made at the Road Materials Testing Laboratory of the Engineering Experiment Station at the Kansas State Agricultural College at Manhattan, Kansas. All the tests were made by the same operator under standard laboratory conditions. Two different river sands were tested, taken from plants on two different rivers in Kansas; one sample of Flint sand was used. The two river sands are denoted in this report as sands R1, and R2, and the Flint sand is denoted in this report as F. The cement used in making the strength tests was a mixture of two standard brands, bought on the open market, and complying with the standard specifications for portland cement.

The physical qualities of the sands were as follows:

| | R1 | R2 | F |
|---|---|---|---|
| Specific gravity ... | 2.65 | 2.63 | 2.65 |
| Per cent of voids.. | 37 | 35 | 46 |
| Fineness modulus | 2.94 | 2.89 | 2.95 |
| Wt. dry, lbs. per cu. ft. ..... | 104.5 | 107.8 | 89.2 |
| Wt. with 5% moisture ..... | 81.9 | 81.0 | 64.6 |
| Wt. with 10% moisture ..... | 88.6 | 87.8 | 66.7 |
| Bulking with 5% moisture ..... | 34% | 39% | 45% |
| Bulking with 10% moisture ..... | 30% | 35% | 47% |

Tensile and compressive strength tests were made by breaking 30 specimens of each sand for tension and 30 specimens for compression. The specimens were made of 1:3 mortar. The averages of the results are as follows:

| | R1 | R2 | F |
|---|---|---|---|
| Tensile strength, lb. per sq. in.... | 368 | 409 | 596 |
| Compressive strength, lbs. per sq. in.... | 4747 | 4823 | 4221 |

*A report presented at the annual meeting of the Missouri Valley Association of Sand and Gravel Producers on December 17, 1925.

Tests were then made to determine the permeability and loss of weight due to freezing. Twelve cylinders, 2 inches by 4 inches, were made of one to three mortar from each sand. Six cylinders of each sand were used for the permeability test and six for the freezing test. The permeability for absorption was determined by drying the cylinders to a constant weight at 220 degrees Fahrenheit, immersing in water for 24 hours and weighing again. This was done five times for each cylinder. After having absorbed water thus, they were crushed to determine their compressive strength.

The resistance to alternate freezing and thawing was determined by immersing the specimens in water for 24 hours at room temperature, freezing for 16 hours, and thawing by immersing in water at 77 degrees Fahrenheit for 8 hours. After thawing, each specimen was brushed carefully to remove any material which might have been loosened by the frost action, and weighed. The original saturated weight of each cylinder was used as a basis for calculation of loss. After being subjected to this alternate freezing and thawing 15 times, the cylinders were crushed to determine their compressive strength. The results of these tests are as follows:

| | R1 | R2 | F |
|---|---|---|---|
| Water absorbed in 24 hours, per cent by weight. | 6.77% | 6.56% | 9.5% |
| Compressive strength absorption, lbs. per sq. in. ..... | 3750 | 3358 | 1758 |
| Loss in weight after freezing 15 times ..... | 3.73% | 0.14% | 1.04% |
| Compressive strength after freezing, lbs. per sq. in. ..... | 3983 | 3950 | 2474 |
| Original compressive strength, lbs. ..... | 4747 | 4823 | 4221 |
| Per cent lost after absorption .... | 21 | 30 | 58 |
| Per cent lost after freezing ..... | 16 | 18 | 41 |

A study of the physical qualities

of the sands shows that they are made of similar mineral matter because their specific gravity is about the same and they have about the same fineness modulus, although the flint sand is not graded as uniformly as the river sand. Fifty-one per cent of the flint sand passed a number 10 sieve and was retained on a number 20 sieve and 36 per cent of it passed a number 8 sieve and was retained on a number 14 sieve. The flint sand was, therefore, deficient in fine material, whereas the two river sands had a very uniform rating. This lack of fine material in the flint sand combined with the fact that the sand grains were either long and narrow, or flat, thin grains caused a very high per cent of voids in the flint sand, 46 per cent compared to 36 per cent for the average river sand. This high per cent of voids is again reflected in the dry weight per cubic foot, 89.2 pounds for flint sand compared to 106 for the average of the river sand. It is true, therefore, that the flint sand is considerably lighter than the river sand but since their specific gravity is the same, practically, a solid cubic foot of flint would weigh the same as a solid voidless cubic foot of river sand. The difference in the weight of the two sands may, therefore, be expressed by saying that there is less sand in a cubic foot of flint sand than in a cubic foot of river sand. This is due entirely to the difference in voids and to the poor grading of the flint sand and to the peculiar shape of the grains.

Another very noticeable difference in the two sands is the bulking effect of moisture. In the case of river sand R1 the maximum bulking was with 5 per cent of moisture and equalled 34 per cent and with the river sand R2 the maximum was 39 per cent, also with 5 per cent of moisture. With this same per cent of moisture, flint sand bulks 45 per cent. When 10 per cent of moisture had been reached, the bulking of the two river sands had decreased, whereas with flint sand the bulking had increased to 47 per cent.

Tests show that the average weight of river sand is 2860 pounds per cubic yard, whereas the average weight of flint sand is 2410 pounds per cubic yard.

Specifications for proportioning concrete call for certain quantities of sand based on the sand being measured when it is dry. However, ordinary conditions are that the sand contains an appreciable amount of moisture when it is handled on the job. Due to the bulking effect of moisture with a moisture content of between 5 and 10 per cent, it is necessary to handle about 1½ yards of wet flint sand in order to have one yard when dry, whereas under the worst conditions, it is only necessary to handle about 1⅓ yards of river sand to have one yard of dry sand. It is, therefore, necessary to handle a mass of sand about 16 per cent greater in bulk for flint sand than for river sand on a given piece of work. It is also of more importance to make corrections for bulking due to moisture when using flint sand than if using river sand.

It is a matter of common knowledge that concrete made of flint sand is hard to work. This fact was borne out in the laboratory tests which showed a less workability and less flowability of material for flint sand than for river sand. This difficulty with flint sand is an inherent difficulty, due to the shape of the grains of sand. Flint, when crushed, naturally breaks into long, thin particles and thin, flat particles which are not easily compacted and which tend to remain in the position in which they first assume, rather than to flow around each other and form a dense mass. Also on actual construction, the flint sand floats to the top.

Strength tests show that flint sand is stronger in tension, whereas the river sand is considerably stronger in compression when made into specimens of 1:3 mortar. It seems probable that the additional tensile strength of flint sand is due to the shape of the grains, whereas the reduced compressive strength may be reasonably considered as due to the excess of voids in the flint sand which are in turn caused by the shape of the grains.

The interesting thing and the feature of practical importance regarding strength, however, is the strength of the two materials as shown after the concrete has been subjected to the forces of nature. The tearing down effect of the forces of nature was tested by allowing cylinders made of the two sands to absorb water and by subjecting them to alternate freezing and thawing, as reported above. In both of these tests the flint sand showed itself to be very much inferior to river sand. Cylinders made of flint

sand absorb about 50 per cent more water than cylinders made of river sand and after having been allowed to absorb water for 24 hours, for five times, the flint cylinder showed a loss of strength of 58 per cent, whereas the river sand showed a loss of strength of only 25 per cent. Freezing and thawing resulted in a loss of weight of the cylinders of about 1 per cent for flint sand and about 3¾ per cent for one river sand and 1/7 of 1 per cent for the other river sand. After having been frozen and thawed 15 times, the flint sand showed a loss of strength of 41 per cent compared to 18 per cent and 16 per cent for the two river sands.

In this climate, the greatest forces tending to deteriorate concrete is the weather, the combination of deterioration by water and tearing down by frost. In countries which have a small rainfall and no frost (such as Egypt, Italy and Southern France) engineering structures have endured for two or three thousand years. In those countries, the climate was such that the effect of rain and frost was reduced to a minimum, but in our climate, where we have alternate wet and dry periods and alternate periods of excessive heat and excessive cold, the most important feature determing durability of concrete is its ability to withstand these tearing down forces. All of us have noticed concrete streets, for instance, which had almost no traffic and which have gone to pieces as rapidly as other similar streets which carried heavy traffic. We cannot overestimate the importance of the durability in the concrete which we turn out. It is not of a great deal of value to prove that one certain material is stronger or weaker than another mateial unless we know that after long continued use this relative virtue will be the same. Our structures are too costly for us to afford to build them for a short period of time and we cannot say that one material is as good as another because its early strength compares favorably, when we know that it will not continue after a short period of exposure to the weather to retains its strength superiority.

We are, therefore, forced to the conclusion, and justified in stating it, that favorable strength tests and low unit weight are not important and should not be given serious consideration. The logical conclusion to arrive at is that concrete made of flint sand is inferior from every point of view to concrete made of river sand because the flint sand concrete will not endure and is, therefore, not worth the money which it costs, even if that first cost may be slightly less than the first cost of river sand concrete.

## Clutch Built Into Motor

A new type synchronous motor has been developed to meet the need for a motor having extra high starting torque, a low starting current, and the high efficiency and unity power-factor characteristics of a synchronous motor. The new motor, available in standard ratings from 60 to 600 h.p. with larger ratings as special machines, is being manufactured by the Westinghouse Electric and Manufacturing Company. The apparatus consists of a standard synchronous motor combined with a magnetic clutch in a single compact unit. The over-all dimensions are practically the same as the hitherto standard synchronous motors of the same ratings, with the exception of the length, which is from four to ten inches longer.

It is particularly adapted for driving crushing or grinding machinery and other loads requiring high starting torque. The starting torque of the clutch-type motor is the same as the maximum running torque, since the motor is brought to synchronous speed and fully excited before applying the load. It can thus exert any required torque up to the value of its pullout torque during starting periods, without shock and at an acceleration rate controllable by adjusting the clutch excitation current through rheostat control. The clutch cannot be excited during starting periods, and the rotor quickly reaches full speed.

The rotor section of the clutch is faced with asbestos lining, riveted to a steel ring and made in halves for easy removal. The armature member of the clutch has a smooth surface where it comes in contact with the brake lining, and steel shims may be inserted between the asbestos lining and the ring to compensate for wear.

The armature member is mounted on a steel disc which has sufficient flexibility to allow the clutch faces to make contact when the clutch coil is excited. When excitation is removed, the flexible member will spring back into its normal postion which provides sufficient clearance between the friction surfaces to prevent contact.

# Caterpillars for Bucyrus Heavy Dragline

Steam shovel design has undergone marked improvement during the last few years. To appreciate this, one has only to compare the design of a few years ago with the present day machines.

It is only fourteen years ago that the Bucyrus Company shipped the first dragline to be mounted on caterpillars. It was a machine driven by an oil-engine and weighing approximately 96 tons. At that time it was seriously questioned whether this type of mounting would ever prove practical for excavating machinery. Today most all the smaller shovels are equipped with this mounting.

There has now been built and placed in operation in the field, caterpillar mounting for the Class 320 dragline. This mounting, also available for the 320-B shovel, is composed of four units, one under each corner of the base. These units are made up of two caterpillar belts 36 inches wide, each of which forms a continuous track for two large diameter rollers, an idler tumbler and a driving tumbler.

The caterpillars are almost shoulder high to an average man. Some idea of the size of this new caterpillar-mounted machine is given by the fact that, ready for operation, it weighs approximately a million pounds or 500 tons. In spite of this tremendous weight, the bearing area of the caterpillar belts is such that it can propel itself across soft, yielding ground without difficulty.

The mounting, of course, is of interest to the owner and user of such a large machine, in that it eliminates a large number of the pitmen and track men which are required when such a machine is mounted on railroad trucks. Another great advantage to the man in the field is that this mounting does away with track breakage which is bound to occur if care is not used by the pit men. This new machine also makes the turning of corners a simple matter compared with the troublesome job of turning a truck mounted machine.

### Bay City Builds Warehouse

The Bay City Dredge Works has under construction, a steel warehouse and service station, for the convenience of Eastern contractors at Roselle, New Jersey. This warehouse will be used for the storage of new Bay City Excavators, Model 16-B and Model 4, and a complete line of parts will be carried in stock for immediate delivery. The warehouse will be under the direction of the Eastern office of the Company at 302 Broadway, New York City, Eugene P. Reading, manager.

The Bay City Dredge Works announces the appointment of two new sales representatives, Herbert Gad, Martin Building, Birmingham, Alabama, for Mississippi and Alabama, and Messrs. Rumsey and Rumsey, 485 51st Street, Milwaukee, Wisconsin, for Wisconsin.

Bucyrus 320 Electric Dragline Stripping Phospate

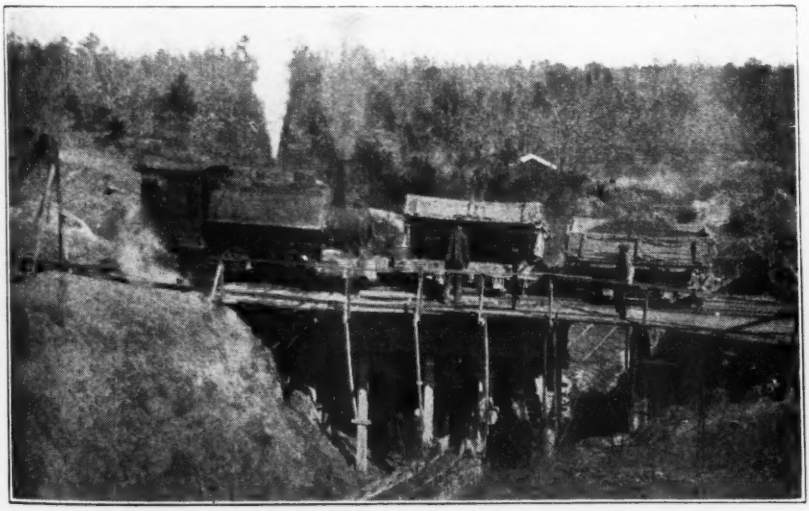
# An Economical Plant Investment Returning Good Dividends

SITUATED in Franklin county, northern Alabama, on the highest railroad point in the state and about 25 miles south of Sheffield and Muscle Shoals, on the Tennessee River at a point known as Spruce Pine, is the plant of the Spruce Pine Sand and Gravel Company. This territory is well known for its wonderful climate, picturesque lakes and trees. The operations of this company are of interest not only because of the details involved but also because a woman, Miss Rose Collins, is actively associated with the operations as secretary-treasurer. There are so few women concerned with the problems of plant operation in the sand and gravel industry that Miss Collins was very welcome as the only woman delegate at the recent annual convention of the National Sand and Gravel Association at Atlanta.

The plant is on the crest of a ridge that slopes steeply into a valley where a pond has been formed for water supply purposes. The pit operations are conducted on the slope of the hill. The property covers 400 acres and contains an excellent grade of sand and gravel sufficient to last about 300 years at the present rate of demand. In addition to this deposit of sand and gravel there is a deposit of exceptionally good clay underlying the gravel which will be used in the manufacture of face brick. Another unusual condition is that a good sized deposit of iron ore exists on the property. This ore has been mined at intervals to the extent of more than 50,000 tons.

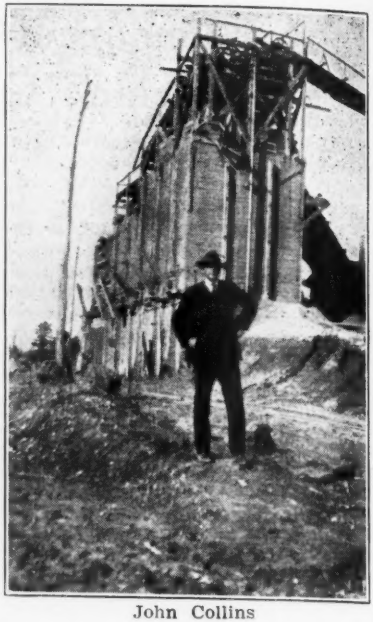
The formation of this deposit is unusual. It appears to have been forced up by the earth during some violent movement in the distant past. The only overburden is the thin strip of top soil supporting the grass and shrubbery. The water supply is unlimited. The plant is alongside the tracks of the Northern Alabama railroad affording easy access to such points as Birmingham, Chattanooga, Louisville and Memphis.

Two Bucyrus shovels are loading the material in the pit into Western 5 yard dump cars which are hauled by an 18 ton Vulcan steam locomotive to the grizzly. One of these shovels is an 18-B machine with a 26 foot boom and a ¾-yard bucket and is at present working against a 40 foot bank. The face of this bank is drilled with hand augers and shot down with Dumorite. The other shovel is a 30-B machine with a 20 foot boom and a 1 yard bucket. This shovel is working against a hard gravel bank.



The Initial Discharge Point

The Conveyor to the Plant



John Collins

The discharge to the grizzly passes through to a hopper which feeds a belt conveyor delivering to the washing and screening plant. This belt conveyor is 375 foot centers and consists of a 24 inch wide United States rubber belt. The belt conveyor elevates the material 65 feet and discharges to a hopper which feeds a set of three Link Belt conical screens.

The first screen has 1½ inch round perforations and separates material from ¼ to 1¼ inch which is sold as concrete gravel. The oversize is delivered to bin storage and sold with the railroad ballast. The second screen has ½-inch round perforations and the oversize from this screen

(Continued to page 106)

A View of the Pit

(Continued from page 104)

passes to the concrete gravel bin. The third screen has ⅜-inch slotted mesh. The oversize from this screen is sold principally as roofing gravel. The material passing the third conical screen passes to a flat screen with ⅛-inch perforations. The rejects from this screen pass into a 72 inch Link Belt sand separator, while the material passing through the screen passes to another 72 inch Link Belt sand separator. In all, six grades of material are produced as follows: railroad ballast, concrete gravel, roofing gravel, concrete sand, building sand, and asphalt sand. All material is thoroughly washed. In each of the conical screens there is one pipe running through the center of the screen and another outside to keep the perforations clean.

The wash from the conical screens and from the sand separators is delivered by a trough to a settling tank designed by W. H. Collins, who was formerly secretary, treasurer and general manager. An asphalt filler sand of excellent quality and fineness is recovered in this way. This tank is designed to interrupt the flow of the wash sufficiently to allow the sand to settle.

The gravel is sprayed with water again as it is being loaded to the cars. Water is obtained from the artificial pond formed in the valley. One 50 h.p. Bessemer oil engine supplies the power for pumping and another of the same size operates the plant.

The plant capacity is 1,000 tons per day, but the production is dependent upon the availability of cars. The present officers of the company are J. R. Collins, president; A. Philbrick, vice-president; and Miss Rose Collins, secretary-treasurer. A. G. DeArman is plant superintendent. The plant represents an economical investment returning excellent dividends. The company is marketing an especially high grade, carefully washed and well sized product.

---

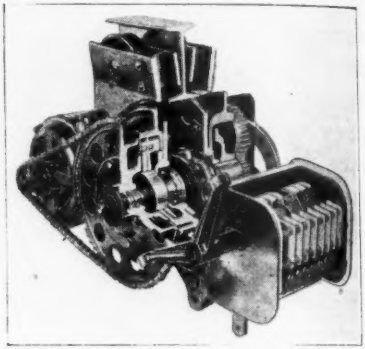
Slagstone Products Corp., Dover, Delaware. Capital $100,000. Deal in building material of all kinds.

The Cement Transit Company, Newaygo, Mich., Capital 5,000 shares, no par value. Siegel W. Judd, N. B. Kelly, and A. W. Ansorge, officers.

B. M. Arthur Lumber Co., Inc. Deal in lumber, coal, lime and builders' materials. R. Hansell, J. Vernon Pimm, E. M. MacFarland, incorporators, Philadelphia, Pa.

## Yale Electric Chain Hoist

The Yale and Towne Manufacturing Company has recently developed a new ball-bearing electric chain hoist known as Model 20B. This hoist embodies such features as close headroom, long lift, higher speed, automatic top and bottom limit stops, and greater over-all strength. This hoist has very unusual factors of safety in the strength of the load-supporting members and is designed to withstand shock loads so common to this class of equipment. All suspension members are made of the highest quality steel.

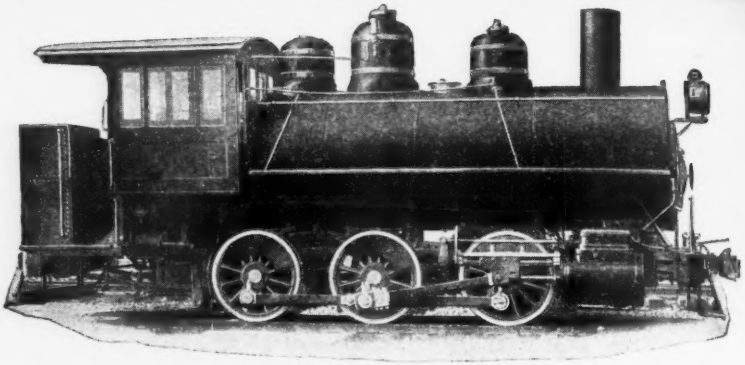


Electric Chain Hoists

The Yale 20B can be quickly adapted to any overhead system. The side plates of the trolley carriage can be spaced on steel bars to fit the desired beam flange. Yale electrically welded steel chain can be furnished for varying lengths of lift. The centralized steel suspension means a constantly balanced load on the trolley wheels and hoisting unit irrespective of load position.

The mechanism is fully enclosed in oil-tight chambers and is compact and easily accessible for inspection without expert service. The ball-bearing load sheave, the latest Yale development, adds a big factor for low current consumption and general all-around hoisting efficiency.

Large chrome vanadium steel ball bearings surrounding the substantial steel load sheave reduce friction and make the hoist still more efficient, requiring a minimum amount of power and giving increased life. The heavy steel one-piece load sheave, ground on an arbor to give perfect concentricity for the ball races, is bronze-bushed for the driving pinion, and splash lubrication provides a continuous flow of oil over gears, pinions and bearings.



60 Ton Baldwin 19x24" 6-Driver, Saddle Tank; 180 lbs. steam Pressure; 44" driving Wheel Centers; 11'0" Wheel Base; Air Brakes; 1,500 Gallon Tank.
ENTIRELY NEW A.S.M.E BOILER BUILT BY BALDWIN LOCO. WKS. AND APPLIED IN 1921. COMPLETELY OVERHAULED—IMMEDIATE SHIPMENT.

**Over Sixty Locomotives in Stock, Thoroughly Overhauled in Our Own Shops, Ready for Immediate Delivery, All Types, Rod and Geared, Narrow and Standard Gauge, 5 to 125 Tons.**

**ALSO**

## RELAYING RAILS

STEAM SHOVELS, LOCOMOTIVE CRANES, DUMP CARS, CAMP CARS, FLAT CARS, GONDOLA CARS, COACHES, ETC.

## SOUTHERN IRON & EQUIPMENT CO.

EST. 1889

ATLANTA, GA.

# FOR SALE OR FOR LEASE

### Special from Our List

1—15 ton INDUSTRIAL 8 wheel M.C.B. CRANE, 50 ft. boom, A.S.M.E. Boiler, Outriggers, One Yard Clam Shell Bucket, located Chicago.

1—Model 105 NORTHWEST COMBINATION SHOVEL, CRANE OR DRAGLINE, ¾ Yd. Shovel Dipper, One Yd. Clam Shell Bucket, Boom 40-45 ft. Located Chicago.

2—NORTHWEST MODEL 104 DRAGLINES Booms 40 or 45 ft. One Yard Bucket.

### Announcement of List

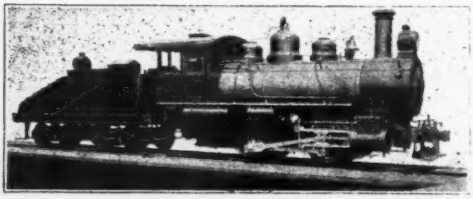
Before purchasing or leasing equipment for your spring operations look over our new list. If you have not received it, we would be glad to mail you one at once. It has a special feature whereby you may allow rentals to apply upon purchase.

## DONALD B. MAC NEAL

231 SOUTH WELLS ST., CHICAGO, ILL.

# For Sale—$4,500.00—Sacrifice Price

Just thoroughly overhauled, in strictly first class condition. Standard gauge Baldwin four wheel 50 ton Switching Engine, 18"x24" cylinders.



**M. MITSHKUN CO.**

**709 Guaranty Trust Bldg.**

**Detroit, Mich.**

# Gas or Electric Hoists and Derricks

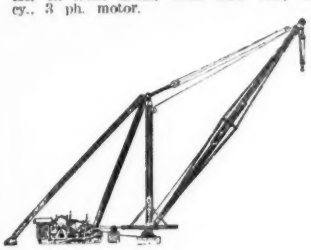
**Available for immediate shipment f.o.b. New York, Chicago, Philadelphia, Pittsburgh**

### GASOLINE OR ELECTRIC HOISTS

Large quantity American double drum hoists with attached swinging gear, capacity 6000 lbs. on single line at 162 ft. per minute with—new 55 H.P. Climax gasoline engine —37 H.P. 220 or 440 volt, 60 cy. 3 ph., A.C. electric motor—35 H.P. 220 volt, D.C. electric motor—or without power for belt drive.

2—52 H.P. single drum Lidgerwood, with 220 volt, 60 cy., 3 ph., A.C. motor, complete with one winch head.

1—75 H.P. double drum Clyde hoist, capacity 10,000 lbs. on rear drum, 5,000 lbs. on front drum, with 220 volt, 60 cy., 3 ph. motor.



### DERRICKS

Large quantity late model American Stiff Leg Derricks, mast 14x14x40 ft. booms 14x14x 60 ft., stiff legs, 14x14x50 or 60 ft. sills if desired, with 12 ft. steel bull wheel, for hook work or bucket operation.

Large quantity late model American Stiff Leg Derricks, mast 16x16x40 ft., booms 14x14x80 ft., trussed with hog rods, legs and sills 14x14 with 16-ft. steel bull wheel, arranged for hook or bucket operation.

Also several Guy Derricks, wood or steel, arranged for single line work or for operating clam shell bucket.

### CABLEWAYS

11—3 and 5-ton, Street Bros. (Howson) Cableways, complete with automatic dump buckets.

### COMPRESSORS

1—2-stage, 950 ft. Sullivan, Class N.B. Compressor.

1—2-stage, 1500 ft. Sullivan, stationary Compressor.

2—Chicago Pneumatic Portable gasoline driven, on rubber-tired wheels, cap. 210 cu. ft.

### CRANES

1—15-ton O & S, 8-wheel M. C. B., 40-ft. boom, bucket operating.

1—O & S 7-ton Crane, 30-ft. boom, ¾-yd. clamshell bucket, traction wheels.

1—Byers Auto Crane, 30-ft. boom, ¾-yd. bucket, traction wheels, steam.

### LOCOMOTIVES

1—Davenport std. ga. 20-ton, 10x16 cylinders, saddle tank. No. 1497.

1—Porter std. ga. saddle tank, 14x22 cylinders, weight 42 tons, like new, only one year of service, shop No. 6853.

3—7-ton, 24-in. ga., Plymouth, gasoline.

6—3-ton, 24-in. ga., gasoline. 3—Plymouth. 3—Whitcomb Fordson.

### STEAM SHOVELS

1—78-C Bucyrus, 1923 model, 30 ft. boom, 19 ft. dipper stick, 3-yd. dipper, on caterpillar. Shop No. 4001.

2—Type "B" Erie Shovels, mounted on caterpillars; one with Crane Boom.

2—Thews on traction wheels, 1, Type A1, 1, Type 0.

### STEAM HOISTS

12—Three-Drum Hoists, with or without boilers. Sizes 10x12, 9x12, 9x10, 8¼x10 and 7x10, with separate swingers for derrick work. All makes.

54—Two-Drum Hoists, with or without boilers. Sizes 12x12, 10x12, 9x10, 8¼x 10, 7x10, 6¼x10, 6x8, and 5x8. Can be equipped with holding drum for bucket work.

### CABLEWAY EXCAVATORS

1—Sauerman 1-yd. Cableway Excavator with 8¼x10 double drum 2-speed hoist, with all necessary cable and sheaves for 1,000 ft. span.

2—Link-Belt Dull Cableway Excavator Buckets; one 1½-yd.; one 1-yd.

### DRILLS

2—No. 3½ Keystone drills.

6—Model 21, Waugh "Denver" derrick drills.

8—Model 31, Waugh "Denver" column drills.

1—D.W. 64, Sullivan column drill.

1—Sullivan tripod drill.

## Equipment Corporation of America

| PITTSBURGH, PA. | CHICAGO, ILL. | PHILADELPHIA, PA. |
|---|---|---|
| 860 Empire Bldg., | 1460 Roanoke Bldg., | 660 Land Title Bldg., |
| Phone Grant 5148 | Phone Randolph 6586 | Phone Rittenhouse 5948 |

# CATERPILLAR

## Cranes—Draglines—Shovels

2—Type "B" Erie Shovels with Crane attach.
1—Type "A" Erie shovel with Crane attach.
1—O&S, 12-ton Crane, Gas Power.
1—Marion 21 Crane with Dragline attach.
1—P&H No. 210, 48-ft. Boom, Gas Power.
1—Monighan, 1½-T Dragline, Diesel Engine.
1—P&H No. 206, Gas Shovel.
1—Monighan 3-T Walker 80-ft. Boom, 2½-yd. Bucket, equipped Diesel Engine.
1—Monighan 2-T Walker Type, 70-hp. Charter Engine, 70-ft. Boom, 2-yd. Bucket.
1—Monighan 1-T Walker Type, 40-ft. Boom, 10-ft. extension 1-yd. Page Bucket.
1—Bucyrus Class 24 with 115-ft. Boom and 3½-yd. Bucket, Steam Power.
1—Model 31 Marion Caterpillar, 1-yd. Dipper.
1—14-B Bucyrus Caterpillar ¾-yd. Dipper.
1—Marion 37 on Caterpillar.
20—Various makes and sizes, R. R., and Trac. Wheel Type, from 1-yd. to 6-yd. cap.

### HOISTING ENGINES

1—9x10 Lidgerwood D/C D/D.
2—Lidgerwood 7x10 D/C D/D, with Boilers.
1—Lambert D/C D/D with Boilers.
2—Lidgerwood 8¼x10 D/C D/D, with Boilers.
1—10x12 D/D Lidgerwood.
1—Stroudsburg 8¼x10 D/C 3-D with Butt Strapped Boiler.

### KEYSTONE EXCAVATORS

2—Model 4 Keystone, equipped with Skimmer and Ditching Scoops, Steam Power.

### LOCOMOTIVES

1—36-in. Ga. Burton, 8-Ton, Gas.
1—36-in. Ga. Porter, 18-Ton, Saddle Tank.
1—36-in. Ga. Davenport, 14-Ton, Saddle Tank.
1—24-in. Ga. Plymouth, 3Ton, Gas.

### AIR COMPRESSORS

1—Sullivan WK-31 port., 4-cyl. motor, 175 ft.

### BOILERS

1—Kewaunee Loco. Type, Butt Strapped, 80 hp., 125 lbs. pres. with Feed Pump.

### BUCKETS

1—1-yd. Hayward Class "E" Clam Shell.
20—30 to 35-cu. ft. Controllable Bottom Pumps.
1—¾-yd. Class "E" Hayward.
1—¾-yd. Williams Favorite.
1—¾-yd. Standard.

**Rennolds Equipment Company**
**36 West Van Buren Street, CHICAGO**

# A Fractional HP Motor or a Complete Power Plant

## SAVE 35 to 45%

Buy Properly Rebuilt Electrical Power Equipment

Every machine completely overhauled and tested – Guaranteed

Write for Stock Bulletin

**The FUERST-FRIEDMAN Co.**
CLEVELAND, OHIO

# Rebuilt Equipment

**FOR SALE** **FOR RENT**

## LOCOMOTIVE CRANES

1—No. 8 Browning 50′ boom, used three months.
1—No. 8 Browning 50′ or 75′ boom, rebuilt.
2—23 ton McMyler 50′ boom.
1—30 ton McMyler 50′ or 75′ boom.
1—10 ton Industrial—4 wheel.

## STEAM SHOVELS

¾ yard—Erie, Osgood or Bucyrus on caterpillars.

## LOCOMOTIVES & CARS

4—24″ gauge Whitcomb, gasoline.
14,000′ of 24″ gauge track.
60—24″ gauge cars with batch boxes.

## BUCKETS

10—¾-yard New Blaw-Knox.

## HOISTING ENGINES

Electric, Gas, Steam—Single, Double & Three Drum.

## MISCELLANEOUS

Air Compressors, Concrete Mixers, Road Rollers, Water Wagons, Pumps, Tanks and Graders.

**Write, Wire or Phone your used construction needs—we can save you money.**

**Pittsburgh Machinery & Equipment Co.**
**1302 Fulton Building, Pittsburgh, Pa.**

# T. H. LETSON CO.

**Good Used Equipment** **Hudson Terminal Bldg. NEW YORK** **Clean Business Methods**

## STEAM SHOVELS

1—¾-yd. type B Erie high lift, traction wheels.
1—¾-yd. type B Erie No. 1566 on Caterpillar.
1—¾-yd. type B Erie No. 1769 on Caterpillar.
1—⅞-yd. Al Thew on Traction Wheels.
1—No. 4 Keystone Excavator No. 4296, with skimmer scoop and trench bucket.

## HOISTS (Steam)

1—7x10 single drum, Skeleton Lidgerwood.
1—8½x10 three drum and boiler Lambert.
1—10x12 D. D. and Swinger Skeleton Lidgerwood.

## HOISTS (Electric)

1—22 H.P. two drum Flory with 2Ph. 60C. 220V. Motor and Solenoid brake.
30—Separate Clyde Electric Swingers with 10 H.P. 3Ph. 60C. 220V. Motors, or without Motors.

## DERRICKS

1—10 ton 80′ boom 14″x14″ Terry Timber Stiff Leg with 12′ Bullwheel.
1—20 ton 70′ boom Steel Guy (Erector's type.)

**For Sale**

## MARION 36 SHOVEL

Full Revolving—Traction Wheels, 24′ Boom, 16′ Dipper Stick, 1¼ or 1½ yd. Dipper. Guaranteed first-class condition.

**ALLEGHENY EQUIPMENT CORPORATION**
**1606 Union Bank Bldg., Pittsburgh, Pa.**

## FOR SALE

1 Steel Stiff Leg Derrick, Wood Mast.
1 Byers Auto Crane.

BARGAIN PRICE

**Lawson Coal & Sand Co.**
Ft. of Bdwy. Hannibal, Mo.

## Wanted

**GRAVEL WASHING SCREEN**

Telsmith preferred. Must be in good condition.

**Hartland Washed Sand & Gravel Co.**
Hartland, Wis.

**15-TON BROWNHOIST LOCOMOTIVE CRANE**
**50' Boom, 8 Wheel, M. C. B.**

This machine has been rebuilt in our own shops and is ready for immediate shipment. Will furnish City of Chicago boiler inspection. A splendid crane for quarry or pit service.

**Hill Clarke & Co., of Chicago**
**649 W. Washington Blvd.—Chicago.**

**FOR SALE—BUCKET CONVEYOR**

98 feet No. 82 Jeffrey Reliance Chain with 5"x8" Malleable Buckets every fifth link

also

Two 9 cu. ft. BLYSTONE MIXERS equipped for direct motor drive. All good condition, removed to increase capacity.

**BERGEN BUILDING BLOCK CO.**
**Ridgefield Park, N. J.**

## DRYERS—CRUSHERS GRINDERS—PULVERIZERS

NEW—For All Purposes—USED
Plants Designed and Equipped

**HOOPER-MOMBERGER CO.**
**Phone: Rector 2919**
**90 West Street New York City**

**NEW CONVEYOR BELT FOR SALE**

Rubber covered belt 6 and 7 ply. Length 300 feet. Width 36 inches. Head & Tail Pulleys, Take Up, Master Gear, Pinion & Bearings. Will sell entire outfit less than cost of new belt.

**THE CADILLAC SAND & GRAVEL CO.**
**1020 Nicholas Bldg., Toledo, Ohio**

## Released Quarry Equipment

70 Ton Bucyrus R.R. Wheels.
No. 8 Superior Gyratory Crusher.
No. 5 Austin Gyratory Crusher.
2—14 Ton 9"x14" Porter Dinkies.
5 Yd. Heavy Duty Steam Shovel Dipper.
We want to move this equipment and are making prices that will do it.
**LEHIGH STONE COMPANY, Kankakee, Ill.**

## 50 Ton Capacity

**HOPPER BOTTOM STEEL ORE CARS**

A-1 condition. Ready for service. Bargain.

**DULUTH IRON & METAL CO.**
**Duluth, Minnesota**

**FOR SALE—SLIGHTLY USED**
**Leather Belting**

Various lengths and widths in excellent condition. Our prices will effect a big saving for you. Must sell at once. Write us about your belting requirements. Address Box 33, PIT and QUARRY, 538 S. Clark St., Chicago, Ill.

## Wanted—Steam Shovel

1¼-yd. to 2-yd. dipper, caterpillar type, standard equipment. Must be in good operating condition.

**PRESTON COUNTY COKE CO.**
**Cascade, W. Va.**

## For Sale

10 Ingersoll-Rand X-70
**Rock Drills**
50% of new price

**ARCHER ARMSTRONG, INC.**
**Grand Central Terminal Bldg.**
**New York City**

**WE SELL Shovels** **WE LEASE Locomotives** **WE BUY Cars**

We absolutely guarantee our rebuilt Equipment. We can ship either new or used equipment from Stock.

**DEMPSTER EQUIPMENT COMPANY**
Jacksonville, Fla. Knoxville, Tenn.
Lexington, Ky.
"The South's Largest Shovel Dealers"

## RAILS

All sections, new and second hand rail; also portable track. Centrally located. Also Cars of all kinds.

**Immediate shipment guaranteed**

**M. K. Frank**
Union Trust Bldg. Pittsburgh, Pa. Park Row Bldg. New York City

## RAILS New and Relay

**ALL WEIGHTS AND SECTIONS FROGS, SWITCHES, TIE PLATES**

**S. W. LINDHEIMER**
**38 S. Dearborn St., Chicago, Ill.**

## RAILS

New or Relay
Any Quantity—Immediate Shipment

**ZELNICKER IN ST. LOUIS**

Steel Ties—Frogs—Switches, Etc.

## RAILS

**SWITCHES AND FROGS**
**LOCOMOTIVES AND CARS**

L. A. Green Railway Equipment Co.
First National Bank Bldg., Pittsburgh, Pa.

# LOCOMOTIVE CRANES

4—20 ton Brownhoists, built 1920 and 1922. 8 wheel MCB trucks, double drums, ASME boilers. Each has 2 cu. yd. clamshell bucket. Like new.

## Caterpillars

1—10 ton Link-Belt, gasoline, caterpillar, 50 ft. boom, double drums and Climax engine. Used only 60 days.
1—10 ton McMyler, gasoline, caterpillar, 40 ft. boom, double drums. NEW.

*Other Cranes—10 to 40 tons*

**PHILIP T. KING**
***"The Crane Man"***
50 Church Street New York

---

**STEAM SHOVELS**

1—Marion 36 Full Circle, Std. Gauge trucks.
1—Osgood ¾ yd. Traction, Overhauled.
1—Osgood ¾ yd. Caterpillar, Heavy Duty.
1—Marion 36 Caterpillar, High Lift, 1½ yd.
1—Marion 300 Stripper, 90′ Boom, 55′ Stick, 6 yd. Dipper. Used one year.
1—65 Bucyrus R. R. Type, 2¼ yd. Dipper.
1—60 Marion R. R. Type, 2½ yd. Dipper.
1—45 Marion R. R. Type, 1¾ yd. Dipper.
1—¾-Yd. Marion, Rigid Caterpillar, High Lift.
1—¾-yd. Erie, Tractor.
1—No. 4 Keystone Steam Shovel.

**MISCELLANEOUS**

4—Ingersoll Rand Air Compressors, 20¼x24, Class A, Straight Line, Steam Driven.
40—Steam & Air Drills, on Tripods.
3 Ton drill steel.
18—4-yd. 24—1½-yd. Western cars, side dump.
2—10x16; 2—9x14 Porter Sad Tk Locos. 36".

**UNION EQUIPMENT CO.**
Box 28, S. S. Youngstown, Ohio

---

## WANTED

Shovel Attachment for Model 6T Austin Gasoline Caterpillar Crane. Forward particulars and price to

**A. R. GELINAS**
5614 Sherbrooke St., West, Montreal, Can.

---

**WANTED—LOCOMOTIVE**
Standard Gauge

Gas or Steam, 20 to 40 ton. Send complete description, including draw bar pull of same, price F. O. B. shipping station, etc. Address Box 22, Pit and Quarry, 538 S. Clark St., Chicago, Ill.

---

## FOR SALE

Model 60 Marion Steam Shovel, R.R. trucks, 2½ yd. dipper, located Delaware, Ohio. Rebuilt at cost of $3,500.00, and not used since. Bargain price.

Estate of A. T. Baldwin
Baldwin, Hutchins & Todd, Attorneys
120 Broadway, New York City

---

## Steam Shovel For Sale

14-B, ⅗-yd. Bucyrus steam, revolving full steel caterpillar shovel, shop No. 3608, good condition, immediate shipment, ready to go right to work. Price f. o. b. car Wisconsin, $3,900.

H. Y. SMITH CO., Milwaukee, Wis.

---

## SLACKLINE CABLEWAYS GRAVEL PLANT

1—Sauerman 2 Cubic Yard Bucket Slackline Cableway Outfit complete with blocks, cables, carriages, etc., for 900 ft. span, including one (1) 100 ft. steel mast with ball and socket base and swivel top. Also one (1) 200 H.P. Thomas Electric Two Speed Cableway Hoist.
1—Complete mcahinery layout consisting of ¾ Yard Slackline Cableway Outfit with 50 H.P. Thomas Two Speed Electric Hoist, Telsmith Washing Screen, feeder, sand tank and 80 ft. steel mast for cableway.
1—No. 4 Keystone Excavator with crawler traction.

SEIBERT-MILBURN CO.
141 N. Front St., Columbus, Ohio

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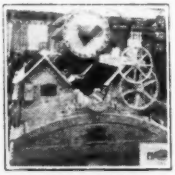
# "PENNSYLVANIA"

## CRUSHER

**for Limestone, Cement, Rock, Shale, Lime, etc.**



(a) Steel frame construction.
(b) Over-Size Bearings.
(c) Quick Acting Cage Adjustment.
(d) Manganese Steel Wear Liners.
(e) Manganese Steel Screen and Hammers

We changed our method of operation, which is reason for selling crusher which is guaranteed in every respect.

LIMESTONE PRODUCTS CORP. OF AMERICA
Newton, N. J.

---

## Wanted—Derrick Irons

The irons for an "A" Frame Derrick to be erected on end of flat car. Ten ton capacity.

**A. B. CRANE, Rion, So. Carolina**

---

**FOR SALE**

1—No. 7½ Austin Crusher, chilled iron fitted.
1—Model 60 Marion Shovel No. 1493.
1—Model 80 Marion Shovel No. 801.
1—Model 70 Bucyrus Steam Shovel.
1—Model "O" Thew Revolving Shovel.
1—1-yd. Vulcan Revolving Shovel.

THE CASPARIS STONE COMPANY
302 Yuster Bldg., Columbus, Ohio

---

## Wanted—JAW CRUSHER

42"x48" Jaw Crusher, Manganese fitted; must be in first-class condition for operation. Give full details, price, and location in answer. Address Box 11, Pit and Quarry, 538 So. Clark St., Chicago.

---

(1) No. 5 Austin Crusher with (2) No. 2 Gates, 50 ft. elevator, 16 ft.—42 inch screen. Commercial rock quarry. First class condition. (1) practically new No. 4 Telsmith with elevator and screen. $1400.00.
(12) No. 248 Ingersoll-Rand Drills, some new,—all in first class condition. Bargain. $50.00 each.

M. WENZEL
4029 So. Benton, Kansas City, Mo.

## FOR SALE

1—6" Manganese Steel Sand Pump.
1—75 HP. locomotive type boiler.
1—Single cylinder steam engine driving the pump.
6" pipe, rubber sleeves, complete all in "A-1" condition.

**W. H. K. BENNETT COMPANY**
**20 E. Jackson Blvd., Chicago, Ill.**

## For Sale—Hoist

1—50 H.P. Double Drum 10x12 Clyde Steam Hoist.
1—80 H.P. FREEMAN Loco Type Steam Boiler.

**KENOSHA SAND & GRAVEL CO.**
**Kenosha, Wisconsin**

## POSITION WANTED

Quarry Superintendent, experienced in hard and soft rock and gravel, installation of equipment and repairs, wishes to connect with concern needing man with energy and who will get results. Remuneration to be governed by results. Address Box 26, Pit and Quarry, 538 S. Clark St., Chicago.

## FOR SALE

### Cranes and Shovels

1—P&H Model 207. Used one season.
1—Northwest Model 104. Used one season.
1—P&H Model 206. Used three months.
1—Thew, ¾-yard, steam. Used one year. $5500.
1—Marion, Model 21, steam. Used two seasons.
1—Erie, Type "B", steam. Rebuilt.
1—Browning Locomotive Crane, 20 Ton Cap., 50' Boom.

### Crushers and Compressors

1—No. 8 Gates, Gyratory. Mang. fit. motor drive.
1—No. 6 Telsmith, Gyratory, Mang. fit.
1—Austin-Western 14"x24", Jaw type. Complete outfit.
3—No. 3 "D", Gates, Gyratory, Mang. fit.
6—Gates Reduction Rolls, 15"x36".
1—I-R. 1000' capacity, 2 stage compressor. Motor drive.
1—I-R. 600' capacity, 2 stage compressor. Motor Drive.

### Miscellaneous

1—60 Ton, 6 Wheel Switcher Locomotive. Built 1913. New firebox in 1923.
1—30 ton Derrick, all steel stiffleg type, 100 ft. boom.
1—10"x12", Steam Hoist, 3 drum, skeleton.
Several oil engines, steam engines, motors, generators, pumps, etc.

**WANTED**

Steam Hoist, 12"x14", 3 Drum, skeleton.

**JAMES WOOD**
**53 W. Jackson Blvd. Chicago, Ill.**

## UNUSUAL VALUES FOR QUICK SALE

**2—300 H. P. Erie Water Tube Boilers, 175 lb. pressure, 135 ft. stack, first class condition ..... $2500.00**

**1—Steam Plant consisting of:**
**2—150 H.P. Walsh and Weidner Boilers.**
**1—150 H.P. PJackson Corliss Engine.**
**1—Alternator.**
**1—300 H.P. Water Heater.**
**All fittings ..... $2850.00**

WIRE, PHONE OR WRITE
**MILLS EQUIPMENT CORPORATION, 1222 Volunteer Bldg., CHATTANOOGA, TENNESSEE**

# Why Don't You Sell Out

**Equipment that You Have No Further Use For?**

Someone of the thousands of other plants in the country might be wanting just what you do not want. Advertise it in PIT and QUARRY. Send us a description of the equipment you want to sell, and we will tell you promptly how much advertising space you should use and what it would cost you. No obligation on your part whatever.